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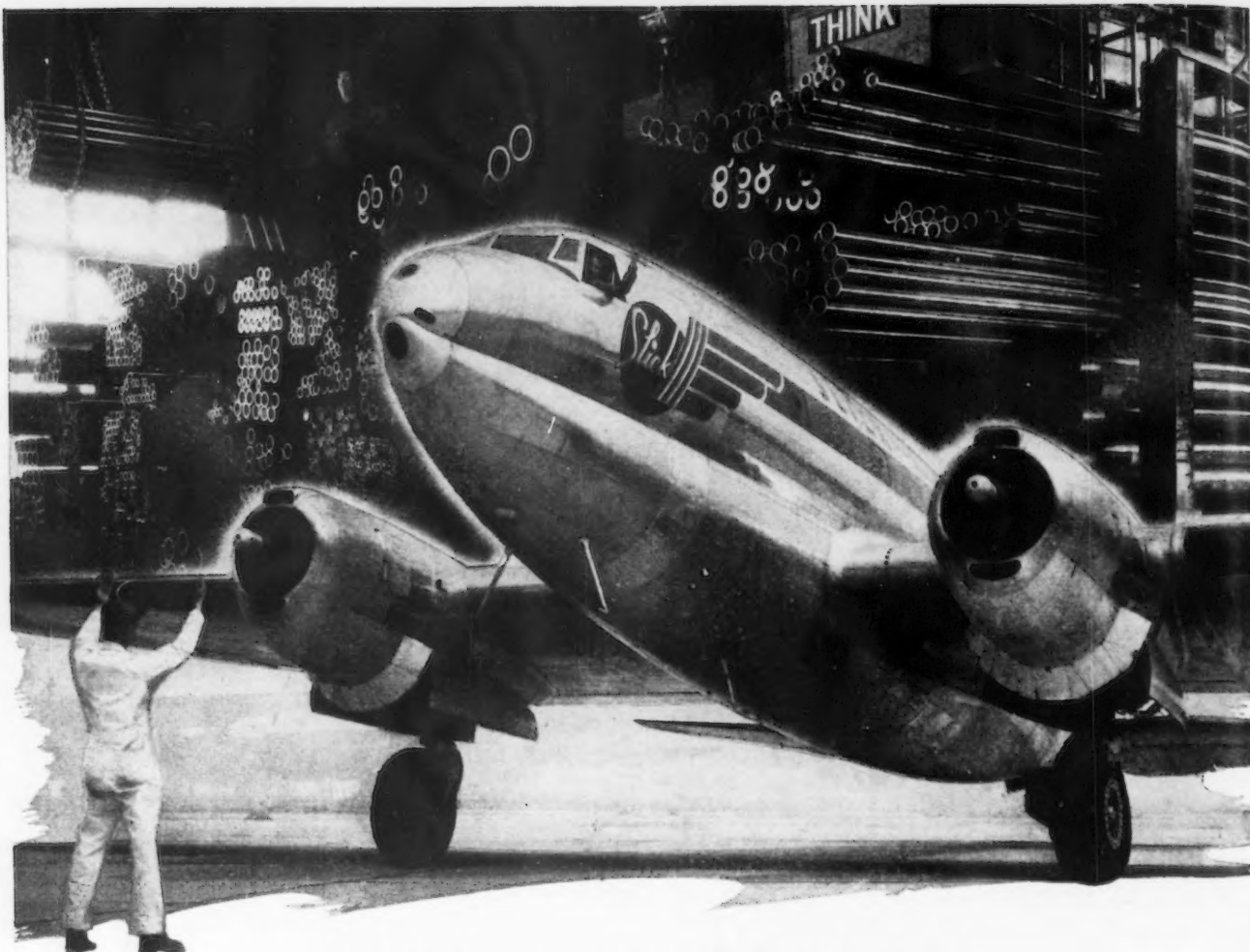
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Not in the Groove

"HISTORY repeats itself." This is one of the more common clichés which sometimes pass for profound observation. Its appeal lies perhaps in the economy of mental effort which it makes possible. As an argument for clinching conclusions regarding the postwar economy, it has performed yeoman although slightly erratic service. A number of predictions regarding the current era, notably the occurrence of mass unemployment in 1947, were based largely on this argument. "It happened this way before; it must happen this way again."

The thoughtful student will always explore the possibility of similar patterns. Certainly an examination of price behavior after the Napoleonic, Civil and First World Wars strongly suggests common compulsions which drive events along the same course. To accept such a pattern without careful examination of the inherent forces and dominant probabilities may lead us astray.

Nothing illustrates this more aptly than the budget of President Truman and the dim present prospects for tax reduction. During the third fiscal year after the Armistice of 1918, Federal taxes had been cut from a wartime peak of \$5.7 billion to \$3.6 billion, a reduction of 38 pct. During the last year of the late war, Uncle Sam collected \$46.5 billion. The Truman budget estimates total levies of \$45.2 billion in the current fiscal year, a decline of less than 3 pct.

Personal income taxes on the earlier occasion had been cut from \$1,270 million to \$719 million, a reduction of 43 pct. The President's program calls for an increase from \$19.8 billion to \$23.2 billion, a rise of 17.5 pct. The top rate of 65 pct in 1918-1919 had been cut to 50 pct in 1921-1922. The chief executive proposes a cut of one two-hundredths of one per cent in the top brackets; 100 pct in the lowest brackets. In the third year after the Armistice, the total Federal budget was off 82.5 pct from the wartime peak. If Congress votes the President's program, expenditures in 1948-1949 will be down 60 pct from the \$100 billion total of 1945.

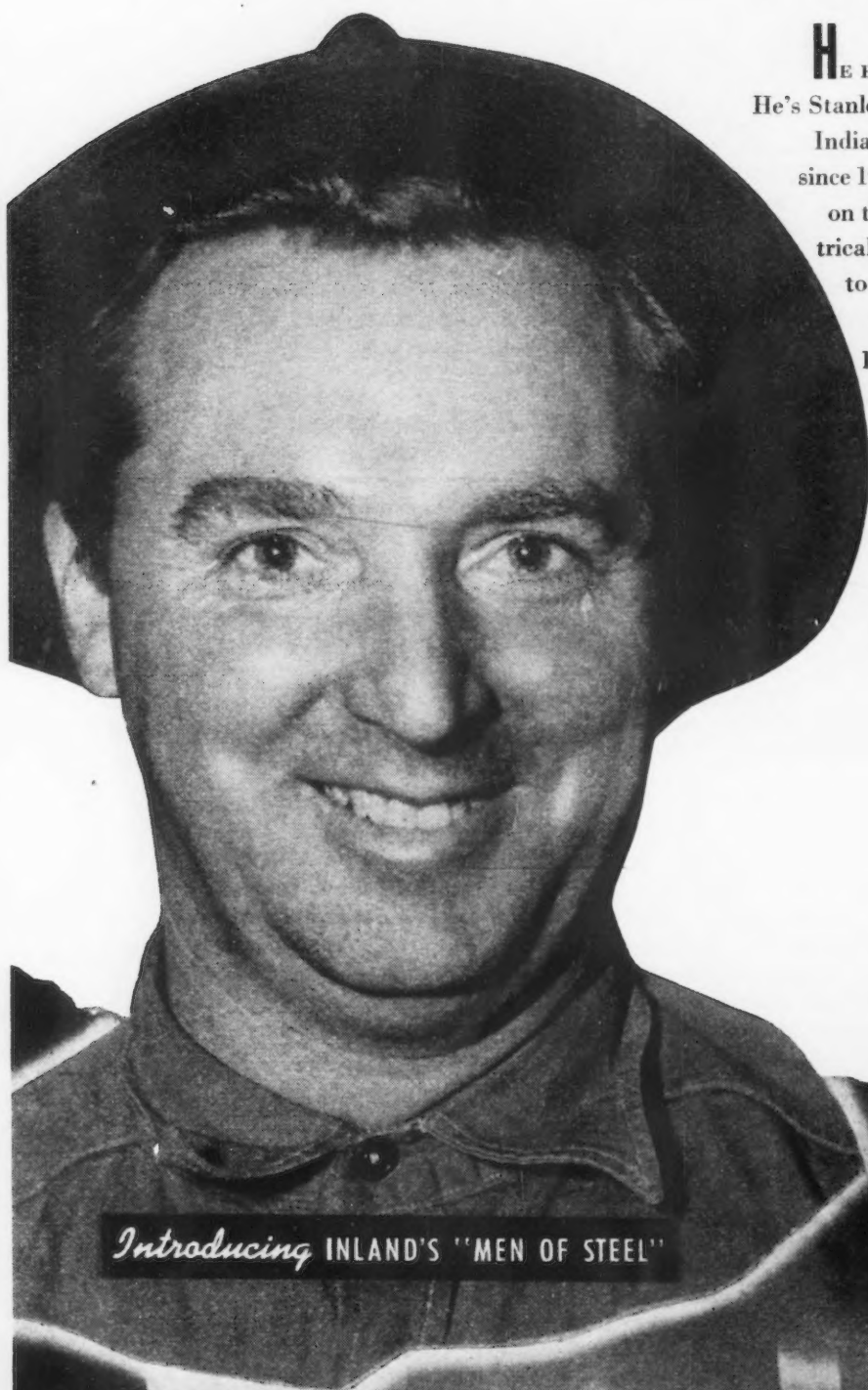
We see here no categorical historic design with fiscal changes following the pattern of other postwar periods. In fact there is considerable evidence in the attitude of the administration and its specific budgetary proposals indicating a complete indifference to the tax burden upon groups who are not politically significant. The relief proposed has obviously been weighed in political scales.

The same motivation may be discerned in the proposed health insurance and the extension of old age and survivors' insurance. This is a patent imitation of the Beveridge "cradle-to-grave" social security program. Conservative actuarial computations indicate that these costs could in a few years easily snowball to an annual \$15 billion charge.

The tax philosophy implicit in the President's program indicates that the major burden of these greater costs will be concentrated upon a minority of able citizens at the top. All this confirms a radical departure from an historic groove. It also suggests the need for a re-definition of the term "corruption."

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Jan. 20, 1948

► Official figures indicate that more than 2 million tons of steel products were exported last year at other than "official mill" export prices. Price levels on this material is somewhat higher than for domestic gray market transactions, running at \$350 to \$400 per ton.

► Consumers claim that base steel prices no longer give an accurate picture of steel costs. They argue that extra charges have increased in number and amount in the past 1½ years so that total steel prices are up far more than base price data shows. Customers say FTC hearings will prove this.

► Some consideration is being given to lightening steel gages in automobiles where this can be done without sacrificing necessary stiffness and strength. For some panels consideration has been given to the possibility of increasing the gage from 24 to 30.

► Wanted—a method of removing copper residuals from plain carbon steel. Producers report that the pct of residual copper continues to creep up and at present averages about 0.07. This is much too high for low carbon quality sheets, particularly for deep drawing jobs. So far there has been no method advanced to eliminate copper.

► Trailer truck drivers around Steubenville travel well heeled when picking up steel cargoes. Many times the truck driver must pay for the shipments at the loading point.

► Belgium now has supplies of pig iron available for export, providing the right articles can be furnished in return. Prices, as for Belgian steel, will be as high as the traffic will bear.

► Those who placed wagers that General Motors would follow Studebaker, or Kaiser-Frazer-Packard-Hudson styling may have difficulty settling their bets. One of the earliest G.M. models to be introduced will retain some evidence of rear fenders like Studebaker but will adopt pontoon-styled front fenders similar to the new Hudson, Packard and K-F.

► U. S. Steel is planning on running the basic open hearth furnace at South Works Carnegie-Illinois for three full campaigns. It is felt that reliable cost data on economics of production cannot be based on the 460 heats made to date.

► The recent boost in nail prices and change in method of quotation by the top producer caught the rest of the trade flatfooted. It will be at least another week or two before they can get out new schedules to quote on a competitive basis.

► Despite government pressure and high water no substantial increase in steel ingot capacity to the levels proposed by some Washington "experts" could be made in the Pittsburgh area under current conditions. There is not enough additional labor available.

► By dry quenching coke at their Dagenham, England, works, Ford Motor claim to be saving 12,400 tons of coal a year. After allowing for moisture loss, Ford claims a saving of 131 lb per ton of iron by the use of dry quenching.

► Under the short-term Anglo-Soviet trade agreement, Britain is to dispatch 25,000 tons of light rails to Russia—10,000 tons will come from new production and the balance from war surplus stocks. Shipment of aluminum and tin to Russia is also being discussed.

► The Moscow line as represented in the London Daily Worker has got itself horribly twisted. It is trying to support the Cominform theory that all the Marshall plan is bad and at the same time curry British favor by insisting that 2 million tons of American steel under the Plan is totally insufficient.

► Following a price cut on consumer appliance lines, there are rumors that General Electric is trying to get suppliers to go along with reductions. Prices have not been reduced on heavy industrial equipment.

► A high frequency induction motor for driving internal grinder spindles has been designed to operate at speeds of 204,000 rpm on 3400 cycle current. The rotor surface travels at 600 mph and outward force is measured in tons.

A New Surface Treatment

A new surface treatment for magnesium alloys, consisting of anodizing the parts in a hot saturated sodium carbonate solution at about 115 v, is described in this article. The treatment forms a white crystalline coating which is an electrical insulator and very resistant to abrasion. Corrosion tests, also reported herein, indicate that the coating affords considerable corrosion resistance and is a good base for paint.

THE extraordinary lightness of magnesium alloys gives them a definite advantage over other metals for use in aircraft, yet they are still being used with considerable hesitancy. This is due primarily to the uncertain corrosion resistance offered by present alloys and surface treatments when the planes are exposed to marine air. A satisfactory solution to the corrosion problem will undoubtedly bring magnesium alloys into much wider use.

This problem may be approached from three viewpoints: (1) Alloy composition; (2) chemical or electrolytic surface treatment, and (3) applied organic coatings. This paper is concerned primarily with the second and describes a new type of anodic treatment for magnesium alloys.¹

Unlike aluminum, magnesium does not form a self-healing oxide film when exposed to normal atmospheric conditions. This can be partially explained by the fact that aluminum oxide occupies 1.24 times the volume of the metal from which it is derived while magnesium oxide occupies only 0.79 times the volume of the metal.² However, most of the other insoluble compounds of magnesium do have a greater volume than the metal they contain, and therefore, could conceiv-

ably form sealed continuous coatings. With this in mind, a large number of experiments were performed, directed toward the electrolytic formation of insoluble magnesium compounds on the surface of magnesium alloys. Preliminary investigation narrowed this down to the formation of an insoluble carbonate.

Practically all of the protective coatings for magnesium alloys which are in use in the United States commercially are formed from solutions containing chromate or dichromate ion as an essential constituent [i. e. chrome pickle, acid dichromate, alkaline dichromate, anodic (US Navy Specification PT 13c), galvanic anodize, and sealed chrome pickle³]. Actually there is little evidence that the compounds of chromium deposited during any of these treatments have a passivating effect on the magnesium, but they do protect by covering the metal and so far have proved more practical than any of the numerous others described. The acid dichromate treatment is recognized as being among the best for salt water corrosion resistance, and it is very widely used.⁴ Because of this, it has been used as a basis of comparison with experimental coatings produced. The acid dichromate treatment consists of a 5-min dip in 15 pct hydrofluoric acid followed by a 45-min boil in 10 pct sodium dichromate with adequate rinsing after each dip.

Electrolytic treatments which do not involve chromates have been proposed,^{5, 6, 7, 8, 9, 10} but as a rule they are not sealed coatings; that is, the current does not reduce itself to a very low value as the coating forms.

The Proposed Treatment

A very promising treatment has been produced which consists of anodizing the magnesium in a hot saturated solution of sodium carbonate using a high voltage. The conditions for the formation of this coating are quite critical but can be controlled, so that very reproducible results are obtained with most magnesium alloys, as indicated in table I.

TABLE I
Effectiveness of Anodic Treatment on Various Magnesium Alloys

ASTM Designation	Dow Alloy	Nominal Composition, Pct				Effectiveness of Anodic Treatment
		Al	Mn	Zn	Mg	
4	H	6.0	0.2	3.0	Bal.	Very good
17	C	9.0	0.1	2.0	Bal.	Very good
13	R	9.0	0.2	0.6	Bal.	Very good
11	M	...	1.5	...	Bal.	Cannot be coated
8	J	6.5	0.2	1.0	Bal.	Very good
9	O	8.5	0.2	0.5	Bal.	Very good
18	FS	3.0	0.3	1.0	Bal.	Coated with difficulty

For Magnesium

By A. L. KOHL

Research Dept.,
Turco Products, Inc.,
Los Angeles

and
HERBERT WATERMAN

Dept. of Chemical Engineering,
University of Southern California,
Los Angeles

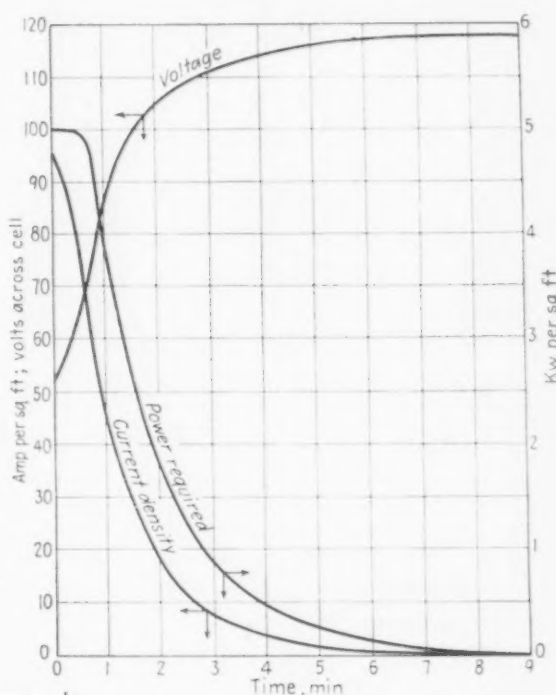
When a satisfactory coating forms, the voltage applied may be increased rapidly to about 115 v and the current density will decrease to a very low value (below 0.15 amp per sq ft) within 1 hr or less. The simplest method for small scale work is to use a resistor in series with the anodizing cell and apply 115 v across the cell and the resistor. This limits the initial current to a reasonable value and allows the voltage across the coating to build up as it becomes a better insulator. A typical set of curves for the production of this coating is given in fig. 1.

If the current density does not decrease to a low value rapidly enough, the surface of the metal may be etched. If the solution and voltage are known to be correct, this will indicate inclusions at the surface of the magnesium part, and if they are at all extensive, the part should be discarded. However, an impure or incorrectly made up solution may also cause etching of the surface.

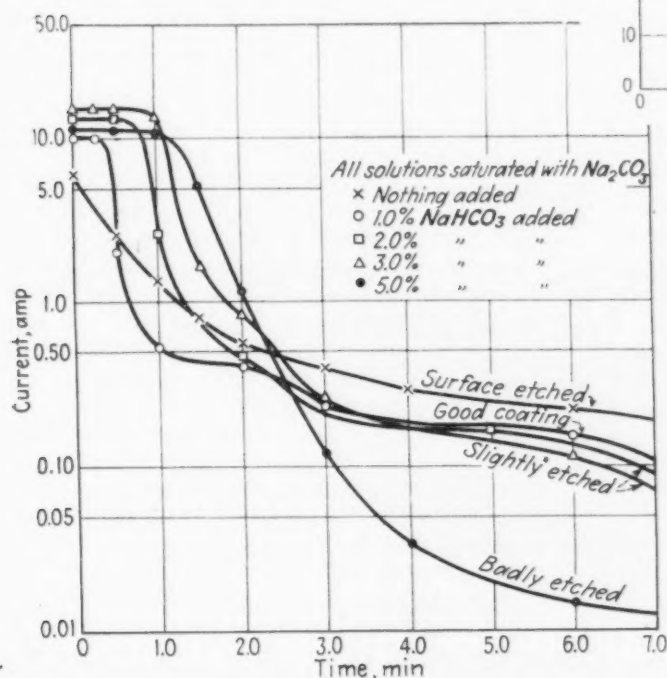
In general, a higher voltage produces more corrosion resistant coatings, but if the voltage is too high (above 125 v) sparking across the film and subsequent pitting may result. The most satisfactory range for highly resistant coatings appears to be 110 to 120 v. The temperature of the bath should be maintained at about 198°F

($\pm 9^\circ$). If the temperature rises above 210°F, powdery coatings will result.

The sodium carbonate solution should be as nearly saturated as possible; in fact it has been found advisable to have an excess of the solid material present. Photographic grade or CP sodium carbonate monohydrate is recommended,



ABOVE
FIG. 1—Variation of voltage, current density and power required during initial period of typical treatment.



LEFT
FIG. 2—Effect of NaHCO_3 additions on coating formation. Specimens were HH sheets of 29 sq meter (approx. 312 sq ft) surface area. Total voltage approximately 115 v, 7.0 ohms in series with cell.

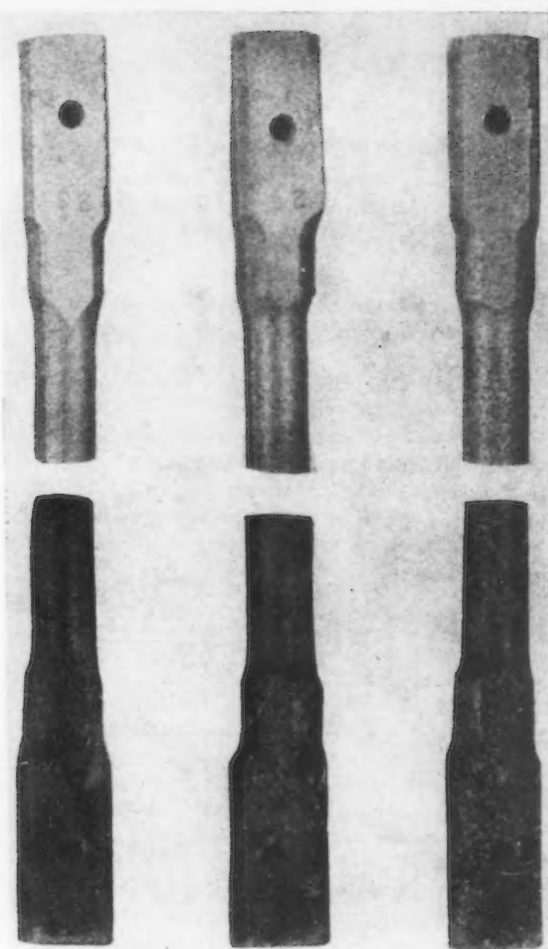


FIG. 3—Variation in corrosion resistance of different samples of the same alloy exposed to salt spray for 245 hr. Upper half of each bar coated by preliminary type of anodic treatment; lower half by the acid dichromate treatment.

TABLE II
Results of Tension Tests on Corroded Dow-H Alloy Bars

Hr Salt Spray Exposure	Approx. Temp., °F	Corrosion Test by Company	Ultimate Stress Lb per sq in.	Point of Failure	Total Elong., Pct
ACID DICHROMATE TREATMENT					
250	95°	A	31,800	Corrosion pit	4.5
250	70°	B	38,200	Near center	9.0
250	80°	C	35,700	Corrosion pit	6.3
500	70°	D	39,700	Corrosion pit	9.3
500	95°	A	33,100	Corrosion pit	6.6
500	70°	B	33,100	Corrosion pit	5.5
500	80°	C	34,400	Corrosion pit	6.0
500	70°	D	40,100	Near center	9.5
1585	Var.	E	40,700	Gage mark	9.0
Average			36,400	.....	7.3
NEW ANODIC PROCESS					
250	95°	A	40,700	Gage mark	9.5
250	70°	B	41,300	Near center	11.0
250	80°	C	40,700	Gage mark	9.3
500	70°	D	42,800	Gage mark	11.0
500	95°	A	41,300	Near center	10.1
500	70°	B	39,700	Flaw in metal	8.5
500	80°	C	40,700	Corrosion spot	9.0
500	70°	D	39,700	Corrosion mark	9.5
1585	Var.	E	40,200	Near center	10.8
1585	Var.	E	40,700	Gage mark	9.0
Average			40,800	.....	9.8

as the sodium chloride content should be kept below 50 parts per million.

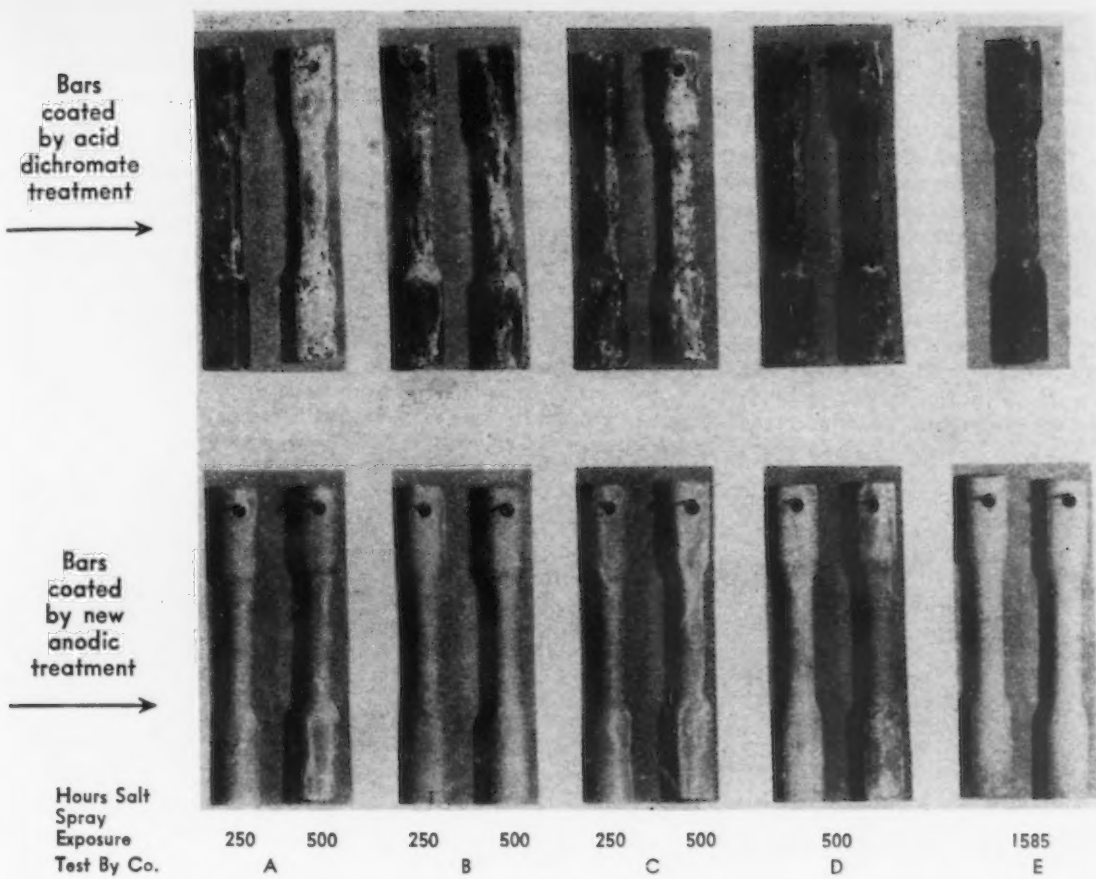
It is frequently necessary to adjust the alkalinity by adding a small amount of NaHCO_3 . Adding 1.5 pct to the solution will make most lots of sodium carbonate perform satisfactorily. More than 2 pct will usually prevent the formation of good coatings. The effect of sodium bicarbonate addition is clearly shown in fig. 2 which represents the current-time curves for samples anodized in five different solutions. It is noted that in each case an increase in the amount of sodium bicarbonate results in a longer initial period of high current density and a smaller current density at the end of 7 min. High current density is accompanied by the removal of magnesium metal so an extended period is not desirable. With pure sodium carbonate solution, the current drops off almost immediately, but does not usually decrease rapidly enough to prevent visible etching of the sample.

The cathode may be any metal not attacked by sodium carbonate. Stainless steel, monel metal and copper have been used satisfactorily. If the tank is used as the cathode, care must be taken to prevent parts from touching it. The parts being anodized may be conveniently held with a previously anodized magnesium sheet. Good electrical contact can be made by forcing the part into a tight-fitting slot cut into the anodized sheet. Other metals in electrical contact cannot be introduced into the bath as a large current may leak across them. Inserts must, therefore, be removed or covered before treatment.

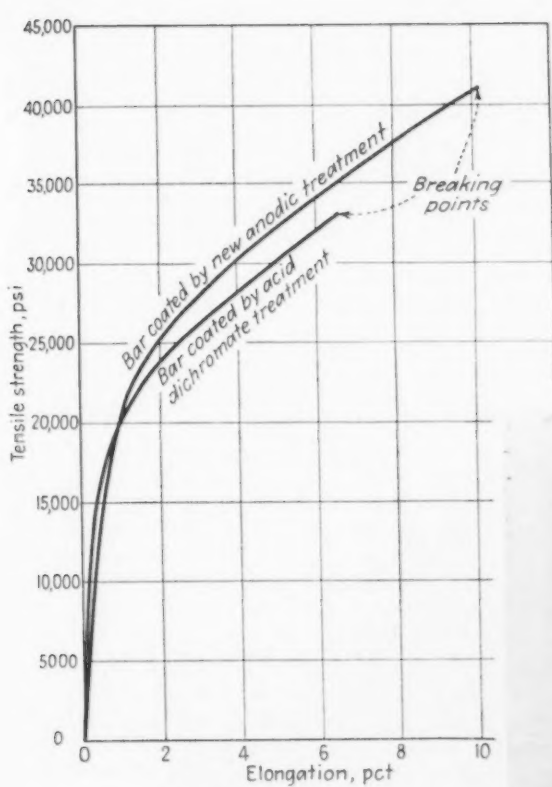
The coating produced by this treatment is a hard white visibly crystalline material. It is apparently similar in composition to a form of basic magnesium carbonate. On being coated, the magnesium article will show an increase in size on the order of 0.0013 cm (0.00052 in.) per surface. This is the result of a decrease in size of the metal itself by approximately 0.00007 cm (0.00003 in.) per surface and the addition of the coating which is on the order of 0.0014 cm (0.00055 in.) thick. The typical increase in weight on being anodized is about 1.32 mg per cm^2 of surface. Analysis of the gas evolved by the reaction of chromic acid on coated metal indicates that about 50 pct of the weight increase is due to CO_2 . The remainder is assumed to be due to combined oxygen and water.

The coating offers considerable abrasion resistance. Specimens have been abraded on a Taber Abraser using No. 17 coarse abrading wheels and 1000-g load. Two specimens of this anodic coating were compared with two samples of anodized aluminum. Minute holes appeared through the surface film of the new coatings after 600 cycles of the abramer and scratches appeared through the aluminum anodic coating after 45 cycles. The chrome pickle and acid dichromate treatments on magnesium offer practically no abrasion resistance.

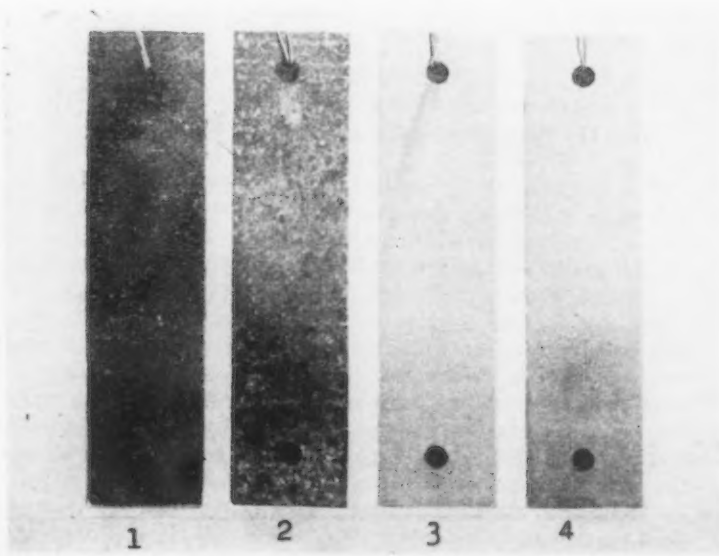
The evaluation of corrosion resistance in the laboratory is an uncertain procedure and any results so obtained must be used with extreme caution.



ABOVE
FIG. 4—Coated magnesium alloy test bars after exposure to salt spray (in five different spray cabinets) for the periods indicated.



LEFT
FIG. 5—Stress-strain curves for coated Dow H alloy test bars after 500 hr salt spray corrosion at 95°F.



RIGHT
FIG. 6—JI-H sheet samples after 56 days exposure to sea air and spray. Specimens 1 and 2 were treated by acid dichromate process; samples 3 and 4 by the new anodic process. Lower portion of each sample dipped in thin zinc chromate primer prior to exposure.

The general indication from a great many corrosion tests is that the new coating offers somewhat better salt spray corrosion resistance on the alloys coated than the acid dichromate.

Early in the work it became apparent that there could be a great deal of corrosion variation between two different samples of the same alloy. Fig. 3 shows the attempted evaluation of a preliminary type of anodic coating (23 v in a solution of Na_2CO_3 and $\text{Na}_2\text{Cr}_2\text{O}_7$). One half of each bar was given this treatment and the other half the acid dichromate. As can be seen, there is more variation between different bars than between the two different coatings.

It was also apparent that no two salt spray

(depending upon the severity of the company's cabinet), the bars were returned for examination and tension test. Fig. 4 shows the bars after corrosion for the periods indicated.

Stress-strain curves, shown in fig. 5, were determined for the two bars corroded 500 hr by company A. Electric resistance strain gages were used for the lower part of the curves, and optical measurement beyond the range of the strain gages. The other bars were pulled similarly, but only total elongation and ultimate load were measured. Results of these tension tests are listed in table II.

In order to obtain a more natural accelerated corrosion test, samples were exposed beneath the

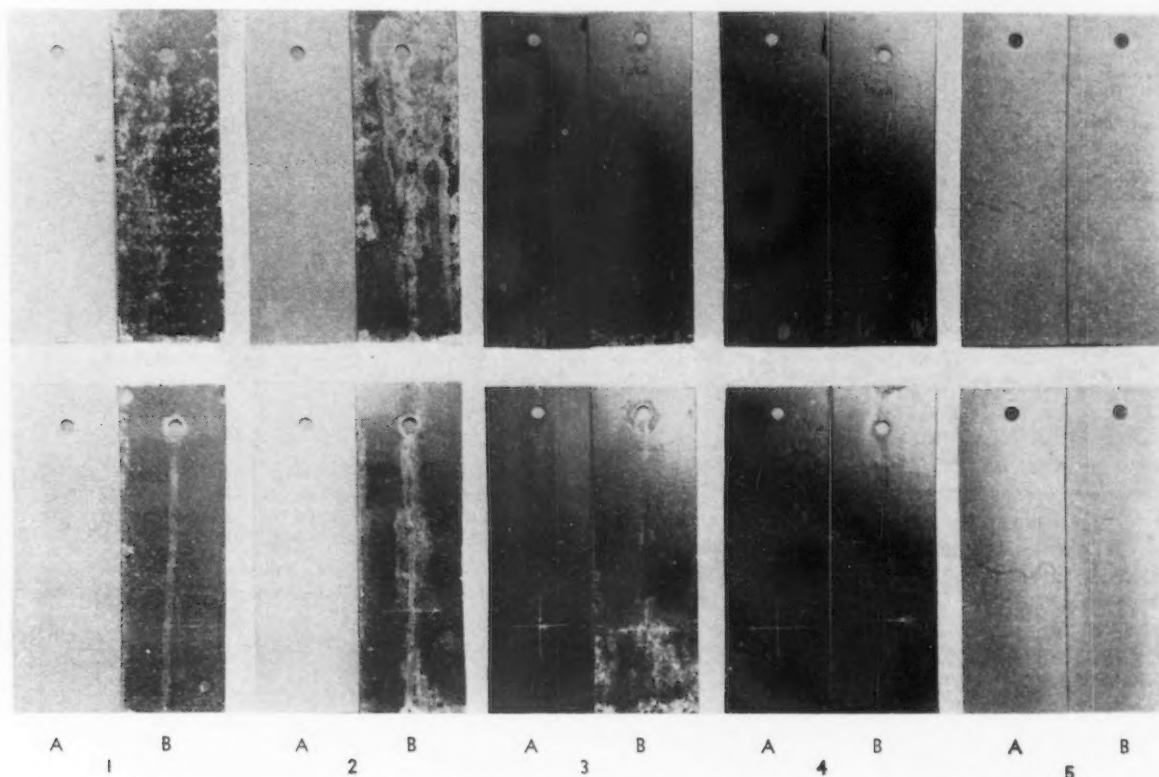


FIG. 7—J1-H sheet samples after 600 hr salt spray exposure. *A*—coated by new anodic process; *B*—coated by acid dichromate process. Group 1 not painted; group 2 painted with one coat thin zinc chromate primer; group 3 painted with one coat zinc chromate primer and one coat blue lacquer; group 4, two coats zinc chromate primer and one coat blue lacquer; group 5, three coats zinc chromate primer. Upper photograph shows opposite side of each sample.

cabinets were alike in severity. In order to get a more representative evaluation of the new coating the following cooperative test was undertaken:

Tension bars were used that were cast from the same batch of virgin metal Dow H alloy. These were numbered, drilled, wire-brushed and boiled in distilled water for 30 min to bring out any possible flux inclusions. Each of four co-operating aircraft companies was sent a set of five bars treated as follows: One was given an acid dichromate treatment, two were given the new coating and two were not coated. One of the untreated bars was given an acid dichromate treatment by the company receiving the set, and the other was given (optionally) any treatment in which the company was interested. After salt spray exposure for a suitable length of time

pier at Santa Monica Beach, Calif. They were located above water level at all times, but exposed to considerable spray. Fig. 6 shows Dow J1-H sheet samples after 56 days' exposure. These were dipped part way in thin zinc chromate primer before exposure. No corrosion appeared on the painted area of the new coating, while on the acid dichromate samples, corrosion broke through the paint in several spots.

Fig. 7 illustrates the results of a salt spray corrosion test on J1-H alloy paint panels. The new anodic process and the acid dichromate treatment were applied to an equal number of panels, and each of the following paint schedules was applied to one sample of each treatment: (1) Not painted; (2) one coat of zinc chromate primer; (3) one coat of zinc chromate primer and one coat of blue lacquer; (4) two

coats of zinc chromate primer and one coat of blue lacquer; and (5) three coats of zinc chromate primer. All samples were scratched through to the bare metal before the corrosion test.

The panels were suspended in the salt spray cabinet from glass rods and separated with short lengths of rubber tubing. In spite of the fact that the positions of the panels were shifted daily, corrosion did not take place evenly on both sides of those samples which were affected.

The untimely death of Herbert Waterman, one of the authors of this article, occurred recently.—Ed.

This has been noted frequently with magnesium alloy sheet samples and appears to be more the fault of the metal than of the salt spray cabinet. The test was continued for 600 hr at approximately 95°F using a 20 pct salt solution spray.

With the exception of the panel painted with three coats of zinc chromate primer, all of the

acid dichromate samples showed signs of corrosion. None of the samples coated by the new process suffered appreciable corrosion other than on the bare metal exposed by the scratch.

References

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- ² U. R. Evans, *Metallic Corrosion Passivity and Protection*, London, Edward Arnold & Co., 1937, p. 122.
- ³ *Dowmetal Magnesium Alloys*, Dow Chemical Co., Midland, Mich., 1943.
- ⁴ DeLong and Gross, *Proceedings of the 30th Annual Convention of the American Electroplaters' Society*, June 1942.
- ⁵ British Patent 508,723, July 5, 1939—Magnesium Elektron Ltd.—Electrolysis in fluoride solutions.
- ⁶ French Patent 844,066, July 19, 1939—Electrolysis in salts of amphoteric metallic oxides as aluminates, arsenates, and zincates. Langbein-Pfanhauser-Werke, A. G.
- ⁷ French Patent 845,549, Aug. 25, 1939—Electrolysis in solution of salts of amphoteric metal plus an insoluble salt forming anion.
- ⁸ French Patent 848,273, Oct. 26, 1939—Gholam A. Chaybany—Electrolysis in alkali metal hydroxide, cyanate, etc.
- ⁹ U. S. Patent 2,196,161—Jean Frosch—Apr. 2, 1940—Electrolysis in alkali metal hydroxide and silicate.
- ¹⁰ Dow No. 12 treatment. Dow Bulletin No. DM39a.

Method for Increasing Steel Ingot Yield

PRODUCTION of sound steel ingots, with increased yield, was described by G. A. Dornin, Jr., of Dornin Molds, Youngstown, Ohio, in a paper delivered before the recent Electric Furnace Steel Conference, AIME. The process involves the procedure for making the ingot and isolating the segregate zone so that it can be cropped with a minimum loss of good steel.

In making the ingot, standard killed-steel

of the segregate, the bottom of the punch being protected by a heat-resistant weld deposit such as Stellite. The next step is to drive the steel surrounding the segregate down past the bottom of the segregate as shown in the third drawing.

Although the segregate is now isolated, the upset ingot is obviously not in a rollable condition, so the last step is to remove it from the holding die and forge it to a size suitable for

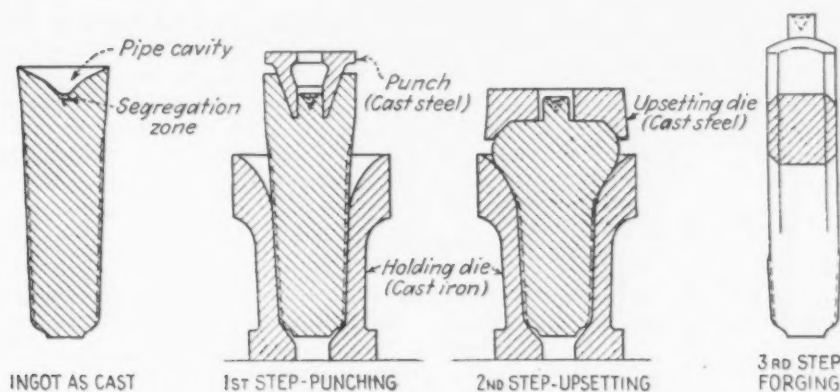


FIG. 1—Schematic sketch of operations in Dornin process when ample upsetting force is available. To process larger ingots on a given press, a so-called two-step procedure is used in lieu of the one-step procedure shown.

melting practice is followed, except that the steel is poured into a big-end-up mold of a taper about two to three times that normally used on hot top ingots.

Subsequent processing is done under a press or presses, in the steps shown in fig. 1. The heated ingot, with the pipe cavity at the upper end and the segregate zone under it, is first placed in a cast-iron holding die and positioned under a press. A hollow, tapered punch is then driven into the top of the ingot to the bottom

the blooming mill, the lower end being held by a manipulator during this operation. Allowing for a total scale loss of 3 to 4 pct, a bottom crop of 2 to 3 pct, and a top crop of 4 to 5 pct, a blooming-mill yield of about 90 pct can be obtained. In the work done to date yields as high as 91 pct are said to have been achieved. The author indicated that this process has been successfully used in the production of some 17,000 tons of electric-furnace steel during a 3-year development period.

Selection of

High Temperature

By REBECCA H. SMITH

Chief Metallurgist,
Northrop-Hendy Co.,
Hawthorne, Calif.

MUCH has been written during the past 2 years on the subject of metals for use at elevated temperatures, especially those suitable for gas turbine blading and discs. Such articles have usually been concerned with the high-temperature properties of the metals under consideration, and have done an excellent job of publicizing the various requirements for efficient operation under conditions of high temperature and stress.

However, good high-temperature properties are not the whole story. A metal must have certain desired characteristics at room temperature, and must have these same qualities every time—for uniformity is one of the most important requisites for highly-stressed parts. This article will first summarize the properties which are generally believed desirable for gas turbine metals, and then illustrate how a material is selected for a specific part.

Oxidation and corrosion resistance are perhaps the most important requirements for materials to be used at elevated temperatures. If a metal oxidizes and scales, it is not suitable for high temperature service regardless of its other good points. Similarly, if it fails due to intergranular corrosive attack, its useful life is ended.

Load-carrying ability is the next essential. This property is measured by short-time tensile tests at elevated temperatures, by the creep rate, and by the stress required to rupture in a given number of hours at the desired temperature. Of these three tests, stress-to rupture is the most widely used. In fact, the stress required for failure in a definite time (or conversely, the time for which a specimen will carry a given load) has been over-emphasized in comparing the merits of different metals. Unless such data is accompanied by a stress elongation curve that shows how much the sample deforms under load, it may be misleading. A metal which will carry the necessary load for 1000 hr without rupturing may nevertheless stretch so much on application of the load that all clearances are destroyed.

Such a metal would not be practical for gas turbine parts.

Short-time tensile tests do not give much information as to the continued ability of a metal to carry load, and the conventional creep test with both stress and temperature constant, does not offer enough data for design purposes. As usually presented, *creep rate* is only the minimum value of stretch under continued constant load, but the initial deformation and the onset of third-stage creep may be of equal importance. A series of stress-rupture curves for different temperatures, with stress plotted against time, and another with stress plotted against elongation, give a good idea of load-carrying ability. Design stresses are based mainly upon stress rupture values, creep rate, and fatigue life, the importance of each factor being determined by the requirements of that particular design. About 60 pct of the stress required to rupture in the life desired, whether it be 1000 or 100,000 hr, is taken as a starting point and then checked against the stress required to cause maximum allowable deformation in that time.

Structural stability is the next requirement for metals which are used at high temperatures. A metal must retain its characteristic structure during exposure to heat and stress, or else undergo definite predictable changes. For instance, many of the *superalloys* developed for gas turbine applications become embrittled after several hundred hours service. If such embrittlement is known and is consistent, allowances can be made for it.

Retention of ductility is important in metals selected for gas turbine parts, both under operating conditions and after running. Thermal stresses of some magnitude are set up between different areas of one part, due to temperature gradients, or across the junction of metals with dissimilar thermal coefficients. It is obviously desirable for the metals to yield locally, rather than to crack; and although it would be difficult to agree on the exact percentage of elongation

Materials for Gas Turbines

A critical review of the factors governing the selection of materials for gas turbine components is presented in this article. Oxidation and corrosion resistance, load-carrying ability, structural stability, and fatigue strength and ductility at elevated temperatures, are some of the general requirements discussed and evaluated. The problems encountered in selecting the best material for a component in the gas turbine are also considered from the metallurgical as well as economic standpoint, embracing the use of castings, forgings and bar stock.

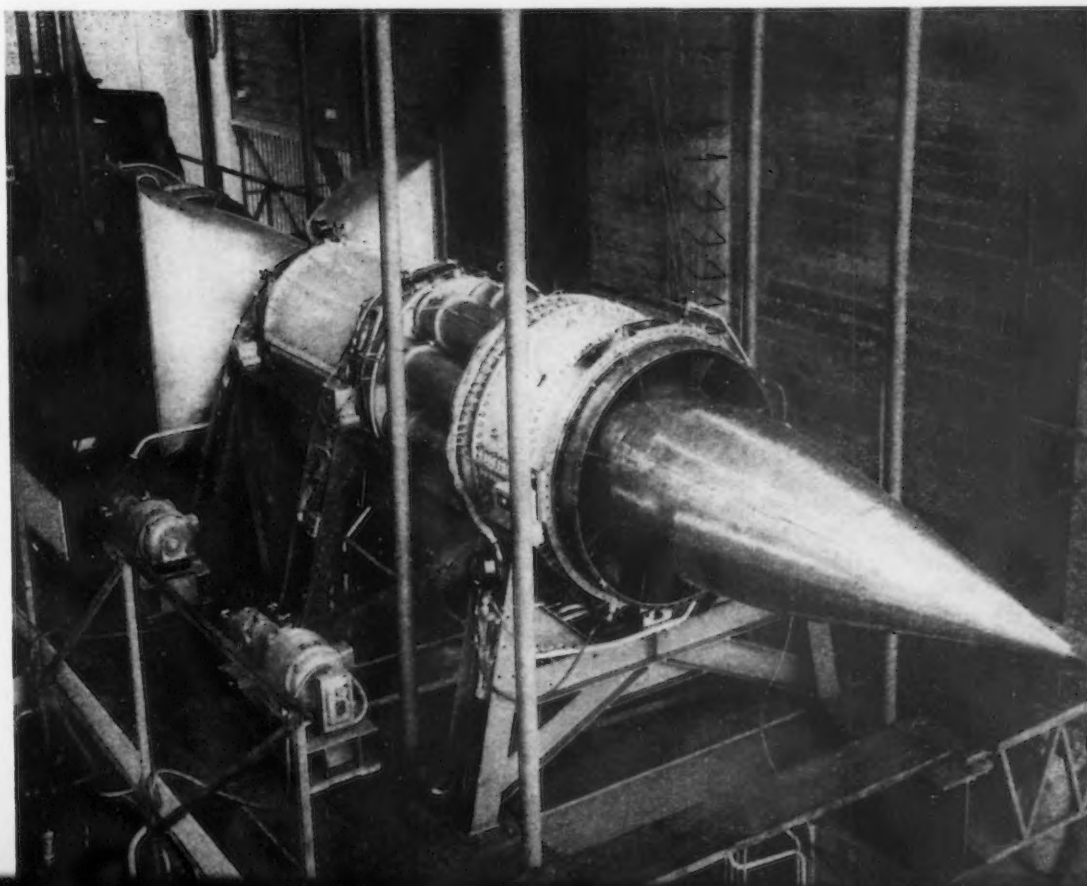
which would guarantee sufficient ductility, still most metallurgists feel that good elongation offers a factor of safety.

As nearly all parts of gas turbines are subject to vibration, the fatigue strength of metals at elevated temperatures is another requisite. To date, the fatigue strengths obtained in laboratory tests have seemed rather high, as compared with other elevated temperature test results. Perhaps the newer methods where a vibratory stress is superimposed on a steady tensile stress will give more accurate values. Good damping capacity is preferred for blades, because a blade

of high internal damping tends to inhibit the building up of resonant vibration. This is especially important in the case of long slender blades. However it is unfortunate that nearly all heat-resistant metals have very low damping capacity.

In addition to possessing the high temperature qualities cited above, metals for service in gas turbines must be capable of assuming the desired shape (either through machining, forging, or casting) and of being joined to other parts, either mechanically or by welding. Several *superalloys* which were considered un-

• • •
A 10,000-hp Turbodyne gas turbine, built by Northrop-Hendy Co. Horsepower of the engine is delivered on a shaft, with about 600 additional lb of jet thrust obtainable.
• • •



machinable 2 years ago, are now being milled, turned, broached, and drilled—although not without objections from the machine shop.

These are the general requirements for metals which are to be used at high temperatures to carry a considerable load without much deformation. How much of each property is necessary in a certain part depends upon the temperatures encountered, the stress applied, the efficiency desired, and the intended operating life. Expendable units designed for very short life are, quite understandably, stressed more highly than turbojets for aircraft, while gas turbines for 100,000-hr stationary installations are designed to even lower allowable stresses. This is due in part to a recognition of the inherent danger of extrapolation from test results at 2000 hr to estimated strengths at 100,000 hr.

One thing must be kept in mind in discussing the properties of heat-resistant metals; they are all so new that generalizations are definitely dangerous. A series of tests of forged discs may indicate that two metals have a creep rate of 0.1 pct per hr in 1000 hr for 28,000 psi stress at 1200° F; yet where bar stock of these same two metals is tested, one has a creep strength of 36,000 psi and the other only 22,000. It must be remembered at all times that laboratory tests are an indication of what a metal may do as a forged disc or cast blade or bolting stock, but the only proof is actual operating experience.

After designers have decided exactly what properties are desired in the various parts of the unit, it is necessary to develop tests which simulate operating conditions closely enough to be translated into probable service life. Since units are built of discs and blades and shafts and rings and housings, not of polished test bars, variables of size and shape and processing are introduced right at the start. Furthermore, it has long been the author's contention that intermittent high temperature and stress affects metal more severely than continued exposure to uniform conditions. This is especially true of the gas turbine where sudden intense changes of temperature occur. In 1000 hr life an aircraft gas turbine may undergo 200 or more cycles of starting, running, and stopping. Perhaps 20 times, there may be *hot starts* with actual flame impingement upon the turbine blades.

The life of the blades cannot be calculated from the 1000-hr stress-rupture strength at the operating temperature without taking into account the momentary exposure to intense heat, the effect of vibratory stress, the damping capacity and natural frequency of the blade, the method of fastening the blade to the wheel, and the thermal stresses set up in the blade. Some metals are more influenced by the geometry of the blade shape than others, so that no hard-and-fast rule can be made for correlating test bar values with blade life. Until many more tests on parts and assemblies, and many more test-stand runs have demonstrated exactly what test-bar properties are necessary for satisfactory service, there must be an element of overdesign to act as a factor of safety.

In concluding the list of properties which are

important for gas turbine parts, consistency cannot be emphasized too strongly. It has often been judged wiser to select a metal with a narrow band of stress-rupture test results instead of another with a somewhat higher average, but greater spread. Since gas turbines, like chains, are no stronger than their weakest part, design stresses must be based on minimum test results instead of typical or average values.

Naturally, differences in forging and heat treating will produce different results, but all the same metal with the same thermal history should have similar properties. To obtain this uniformity from piece to piece, the manufacturer must have had sufficient experience to supply metal which is uniform from heat to heat, and which is not too sensitive to minor variables such as occur in ordinary processing. There is an old saying about there being no substitute for experience, and the manufacturing know-how accumulated from thousands of heats cannot be overestimated.

Uniformity from place to place in the same part is also essential. This depends somewhat upon the shape of the piece but more upon the skill of the forge shop or foundry. In forging, it may be necessary to employ accurate furnaces with controlled atmospheres as well as careful workmanship, to avoid critical cold working and subsequent grain growth in some of the precipitation-hardening alloys. In castings, careful placing of gates combined with close control of both mold and pouring temperatures is required.

The problem of selecting the best material for each part in a gas turbine is rather complicated. When the designers have decided what life and efficiency are desired, and what temperatures and stresses are to be encountered, then the choice of a material which will meet these varied requirements is left to the metallurgist or materials engineer. The most widely discussed gas turbine parts are the turbine rotor blades as these are subjected to the most stringent service. They need good oxidation resistance strength, stability, fatigue strength, and above all, uniformity. Fatigue strength is especially important for blades, because of the fluctuating bending stresses, and because long thin blades may have nodal vibrations. It is desirable to select a metal which is relatively free from notch sensitivity, because no matter how strict the final inspection for machining marks, scratches, and the like, there are few absolutely perfect blades. There is also the possibility that foreign matter may pass through the machine and nick the blades.

Whether the blades should be forgings, castings, or machined from bar stock depends mainly upon the shape of the blade and the temperatures involved. Blades generated from bar stock have two special attributes; uniformity and ease of inspection. It is difficult to determine internal flaws in a forged or cast blade because of the irregular shape, even when utilizing all the usual inspection methods such as X-ray and Zyglo. But bar stock can be checked by super-sonic examination before the blades are machined, and any questionable portions cut out.

Furthermore, since turbine efficiency depends upon blade shape, it is essential that every blade be exactly right and blades which are generated from a master are truly identical. This goal is hard to attain with forgings or castings, if they must be hand-polished, because this introduces the human element. No matter how identical the forgings or castings are as-received, the polished blades ready for assembly will vary slightly one from another.

However, some of the blade alloys which are best from a high temperature standpoint, are so unmachinable that generating them is out of the question. Turbines designed for long life and comparatively low operating temperatures, say 1100° F, often use blades machined from bar stock of 19-9 DL or 16-25-6, both super stainless steels which develop exceptionally good yield strength from hot-cold-working. The stress-rupture strength of these alloys at 1200° F is on the order of 30,000 to 35,000 psi for 1000 hr. It is generally believed that cold-worked properties do not persist at temperatures above 1300° F, so when blades are to operate at 1200° to 1500° F, precipitation-hardened metals are often selected. These may be either bar stock or forgings, and include such materials as the cobalt-alloys N-155, S-590 and S-816; and the nickel alloys K-42-B, Inconel X and Nimonic 80.

Such materials obtain their good high-temperature properties through a solution treatment followed by aging. It is possible to vary the properties almost at will by controlling the heat treatment, since they are markedly sensitive to solution temperature. They are also very much affected by forging practice, and it is essential to keep forging temperatures high and use controlled atmospheres. Hot-cold-work is harmful, as it often results in minute ruptures. Stress-rupture strengths for 1000 hr at 1200° F are on the order of 45,000 psi; at 1350° F, about 30,000 psi; and at 1500° F, about 15,000 psi.

As blade temperatures become higher, the precipitation-hardened alloys (usually aged at 1350° to 1400°F) have a tendency to overage and lose strength. For this reason, cobalt-base castings of the Vitallium type are generally considered best for very high temperature work, say over 1500°F. Such castings are not solution-treated-and-aged, but are given an aging treatment at the approximate service temperature. Only recently have advances been made in forging these high-cobalt alloys. The five which appear to be currently used for turbine blades are S-816, Vitallium, 6059, X-40, 422-19 and 63. Stress-rupture strengths of these cast alloys for 1000 hr at 1500°F are around 20,000 psi; at 1600°F, about 15,000 psi; at 1700°F about 10,000 psi.

At the higher temperatures of 1600°, 1700°, and 1800°F, X-40 appears the strongest, with 14,000 psi at 1700°F, and 10,000 psi at 1800°F for 1000 hr. All the blade materials can be welded. If the design is such that the blades are welded to the disc, the main factors to be considered are the composition of the disc and the best welding rod. If the blades are mechanically

• Discussions of other phases of the use and production of materials for high temperature applications are contained in the following articles published in *THE IRON AGE*.

Martin Fleischmann, "16-25-6 Alloy for Gas Turbines," Jan. 17, 1946, p. 44; Jan. 24, p. 50.

N. J. Grant, "High Temperature Alloys," May 23, 1946, p. 42; May 30, p. 50; June 6, p. 77; June 20, p. 60.

"Cr-Mo Steels Tested at 900° to 1000°F," June 6, 1946, p. 65.

"German High Temperature Turbine Blade Steel," July 11, 1946, p. 52.

W. L. Badger, "Metallurgical Development of Materials for Turbosuperchargers and Aircraft Gas Turbines," July 25, 1946, p. 40; Aug. 1, p. 60.

W. O. Binder, "Alloys for High Temperature Service," Nov. 7, 1946, p. 46; Nov. 14, p. 92.

E. S. Kopecki, "Metallurgy," Jan. 2, 1947, p. 96.

P. B. Scharf, "Roll Bending and Flash Welding Stainless Steel for Turbosupercharger Rings," Jan. 23, 1947, p. 52.

"High Temperature, High-Strength Porcelains," Mar. 13, 1947, p. 57.

J. B. Henry, Jr., "Characteristics of Three High Temperature Alloys," June 12, 1947, p. 58.

"Ceramic Coatings for High Temperature Service," Aug. 7, 1947, p. 77.

"New High Temperature Material," Nov. 27, 1947, p. 86.

E. S. Kopecki, "Metallurgy," Jan. 1, 1948, p. 198.

attached to the disc, machinability is extremely important.

From an economic point of view, it is often cheaper to use castings for experimental jobs where blade shapes may be changed frequently, and thus save the high cost of forging dies. Deliveries may be faster on castings, also. However, where blading is a production item, there is no consistent economic advantage to castings, forgings, or machined blades.

Turbine wheels present almost as many problems as turbine blades. Although not exposed to such high temperatures, they are subjected to severe thermal stresses due to unequal distribution of heat. Depending upon the design life, temperatures, and stresses, wheels may be made of a super stainless steel such as 19-9 DL or 16-25-6 or of a precipitation-hardened stainless such as GT-45, or a cobalt alloy such as N-155 or S-590.

To develop the high physical properties necessary for gas turbine discs, forged wheels are often cold worked to the approximate contour desired. This method produces good strength properties and good elongation, which many engineers consider one of the most important requisites for discs. It is generally used for 19-9 DL and 16-25-6. The main disadvantage of this method is the cost of the forging dies. Where only three or four prototypes of an experimental design are being made, it is not economically practical to pay \$4,000 or \$5,000 for forging dies; however, where a number of identical discs are being produced, the saving in machining cost and in metal often make contour forgings cheaper. The cobalt-containing alloys such as N-155 and S-590 are used for discs in the

as-forged and stress-relieved condition. Such metals are extremely sensitive to forging variables.

Another method of obtaining high physical properties in discs is by buying as-forged pancake, machining out the discs, and over-speeding them. This method effectively increases the strength, and has the advantage that the cold working due to stressing over the yield point is more uniform than that due to forging. However, there is some feeling that this over-stressing does not increase the transverse elongation as much as is desirable. Small wheels are not such a problem, as thousands have been made successfully. But large discs, say over 35 in. in diam, or more than 6 in. thick, present several material difficulties. It is necessary to select a metal which can be made in sound ingots large enough for the desired forging, and then have very careful control of heating and forging procedures.

Where temperatures and stresses are higher, precipitation-hardened materials are available. Some of these alloys are not much affected by section size, a great advantage.

In addition to the turbine disc blades, the combustion chamber and tail-cone parts must withstand high temperatures. However, these are stationary and therefore not so highly stressed as the rotor blades. The newly developed heat resistant sheet metals such as N-155 are formable and weldable, and are suitable for many sheet metal parts. For firewalls, much more highly alloyed cobalt-base alloys such as Vitallium, X-40, and S-816 are available in sheet form. With enough care and sufficient anneals, these too can be formed, but are naturally much more difficult to work than N-155, 19-9 DL, and Hastelloy C.

Most of the attention has been given to turbine and combustion chamber parts because they are the limiting factors in design. While no one would deny that the procurement of quality forgings and castings for highly-stressed compressor parts is still a problem, still it is not a new metallurgical problem since there are years of steam turbine experience to draw on. The 13 pct Cr steel, type 403, is still giving satisfactory service in blading; regular SAE steels are good for shafts and discs; and the higher-strength aluminum alloys are performing well as housings.

To summarize, the factors governing the selection of materials for gas turbines are both metallurgical and economic, and to some extent may be influenced by the international situation. When metallurgical demands for strength and stability are satisfied, ease of fabrication or cost or delivery may well dictate the choice. Sometimes it is wiser to design to easily available materials in order to conserve stocks of strategic metals. The correct selection of materials for gas turbines should be made by designer and materials engineer, with frequent consultation with the manufacturing division and the sources.

Since so many of the high temperature alloys are very sensitive to processing variables, constant care and meticulous attention to detail are required from the alloy maker, foundry forge shop, and heat treater. Because of the newness of these heat-resistant metals, there is a dearth of manufacturing experience, and gas turbine manufacturers must necessarily depend on their sources for reliable metals. Only by close co-operation between designers, engineers, producers and suppliers can the very best gas turbine materials be selected.

Hot Pressing Metal Powders

THE results of an investigation into the working of metal powders are revealed by G. Wassermann in *Metallforschung*, vol. 2, 1947, p. 129, translated by Wilhelm Werner, Dusseldorf. The author found that by applying a wash of iron powder and water to the adjacent surfaces of the cold-pressed component parts of a large piece, i.e., a large hollow cylinder, and by applying pressure to the top of the piece during sintering, it is possible to sinter the parts firmly together into one compact body.

Rods and tubes of any length can be made by filling an iron tube with metal powder and drawing the tube in the usual manner in a drawing bench, or rolling it in a mill with closed grooves. Drawing and rolling can be performed either hot or cold. In the latter case the tube is finally subjected to a sintering treatment. When making tubes, a cylindrical steel mandrel has to be provided for in the axis of the outer tube. After drawing and rolling and before sintering, the steel mandrel is withdrawn. Also, prepressed blanks of cylindrical shape may be used, instead of metal powder, for filling the tube. The method described is especially advantageous when work-

ing mixtures of metal powders, the components of which have different melting points. In this case the outer tube offers an efficient protection against sweating out or volatilization of the components with low melting point.

Further experiments showed that the hotpressing of metal powders can be simplified by eliminating the initial cold pressing. In this way bushings were made by inserting iron powder into a crucible and heating at 1560° to 1830°F in a hydrogen atmosphere for about 1 hr. The resulting iron cake was taken out of the crucible and immediately placed into the die of a friction-driven screw press, where it received its final shape with one or two strokes. The microstructure of the pressed bushings was fine-grained and homogeneous throughout. The tensile strength was 51,200 to 63,900 psi, and the elongation 27 to 35 pct. The test samples did not show any sensitiveness to shock or impact. This method of hot pressing sintered cakes is especially applicable to metal powders which, on account of their particle shape, are difficult to be pressed in the cold state, but which sinter very well, as is the case with carbonyl iron powder.

High Speed Machining of Aluminum

IN high speed cutting tests made on 14S, 14S-T, and 24S-T aluminum alloys by Aluminum Co. of America on a specially designed and constructed high speed turret lathe, surface cutting speeds up to 20,000 fpm without any cutting or coolant fluids were achieved and no indication of an upper speed limit was observed. The lathe, designed with Cincinnati Milling and Grinding Machine Co.'s Filmatic shoe type motor and spindle bearings of a special design and direct drive, performed well in these tests, which were run with a single point carbide tool. However, it was found that a relatively large amount of power was required to drive the spindle when no cut was being made.

Results of these high speed aluminum machining experiments were reported in a paper, "Development of a High Speed Lathe for Machining Aluminums," by R. L. Templin, assistant director of research and chief engineer of tests, Aluminum Co. of America, New Kensington, Pa., at the recent annual meeting of the American Society of Mechanical Engineers.

The volume of metal that can be removed, cubic inches per minute, for each hp going into the cut was found to be greater for as-rolled 14S alloy than for the 14S-T or 24S-T alloys and the metal removal increases with increasing rates of tool feed. In these tests, as much as 7.5 cu in. of metal were removed for each hp developed at the cut. Net hp required to remove a given volume of metal was found to be independent of the cutting speed and depth of cut.

In the experiments, as much as 470 cu in. per min of metal, or approximately 47 lb per min, were removed without overtaxing the lathe, and there were no indications evident that greater amounts could not be removed.

The amount of power required to drive the spindle when there was no cutting action by the tool was greater than had been expected. The 80 hp motor operated as much as 70 pct of capacity when driving the idle spindle at 9000 rpm. Increasing the clearance on thrust and radial bearings had little effect, but varying the hydraulic pressure to the spindle bearing shoe cylinders did result in some variation in the idling power consumption. Changing lubricating and hydraulic oils to lighter grades yielded an average reduction of idling power consumption of about 17 pct.

At the test speeds, it was found that satisfactory surface quality could be maintained only if the cutting tools were designed to direct chips away from the work rapidly enough to prevent them from marring the finished surface. Even though cuts were made without a cutting or cooling compound, the work remained cool and the chips carried away the heat of cutting.

More efficient turning operations from the standpoint of power consumption, it was deter-

Metal Removal Rates in Machining 14S and 24S-T Aluminum Alloy

Alloy	Cutting Speed Fpm	Depth of Cut In.	Volume of Metal Removed, Cu In. per Min at Nominal Feed per Rev. of				
			0.005	0.007	0.010	0.014	0.020
14S	5,000	0.125	35	49.5	70	99	
	7,070	0.125	49.5	70	99	140	
	10,000	0.125	70	99	140	198	
14S	5,000	0.25	70	99	140	198	
	7,070	0.25	99	140	198	280	
	10,000	0.25	140	198	280	396	
24S-T	10,000	0.125	75	106	150	212	300
	14,140	0.125	106	150	212	300	424
	20,000	0.125	150	212	300	424	600

mined, can be achieved by employing larger tool feeds, while finish and dimensional control can be maintained only with the smaller feeds. The feed, of course, should not be reduced below the point that will assure proper cutting.

The 14S and 14S-T forging stock used in the experiments was 8-in. diam stock that was machined down into a flanged testpiece with a 5.75 in. diam and 9.5 in. long test section. The 24S-T alloy was cut into 13-in. diam disks from 3 and 4 in. plate stock. The accompanying table shows the metal removal at various cutting speeds and feeds and at 0.125 and 0.25 in. depth of cuts. Additional tests were run with feed rates as small as 0.00003 in. per rev. and as large as 0.025 in. per rev.

In all tests, the lathe was set to nominal values of speed, feed and depth of cut, but actual values were determined by measurement. In many cases the dimensions and description of the chips themselves were obtained, and the cutting tool was hand stoned between cuts.

Warner & Swasey collet type and three-jaw scroll type chucks were used, both performing satisfactorily at moderate speeds. However, the collet chuck appeared to be better suited for the higher speeds.

Tests were made to determine the approximate degree of unbalance that would be permissible in a workpiece to be turned in this high speed lathe. The test piece was a 13-in. diam disk of 24S-T, cut from 3-in. plate stock which was unbalanced by drilling a hole in the face. The hole was 4.75 in. from the center of the plate and various degrees of unbalance were obtained by varying the diameter and depth of the hole. The centrifugal force, in lb, at a spindle speed of 7000 rpm, ranged from 5.96 lb when the hole was 0.125 in. diam and 0.75 in. deep, to 794 lb with a hole 0.719 in. diam and 2 31/32 in. deep. It was obvious from the tests that an unbalanced condition which produced a centrifugal force of more than about 700 lb would not be permissible for the test lathe.

Spectrographic Analysis Of

Use of the spectrograph has made possible rapid and accurate analysis of nickel alloys. In addition to the conventional operations exercised at the International Nickel Co. laboratory in Huntington, W. Va., some interesting and unusual analytical techniques have been developed and put to practical use. Methods that provide for the analysis of thin materials, materials in low concentration, and small areas such as inclusions and cracks, are described herein.

SINCE all quantitative spectrographic analysis is based on the comparison of an unknown with a series of known standards, the acquisition of accurately analyzed standards is important. Frequently the chemical laboratory can help, but quite often either the low concentration or the nature of the element render chemical analysis difficult. While some of the methods of analysis to be described in this article are of the conventional production control type, interesting techniques have been developed to provide for the analysis of thin materials, of materials in low concentration, and of small areas such as inclusions and cracks.

Of the two spectrographs in the laboratory of the International Nickel Co. Huntington Works, one is of the large Littrow type made by Bausch & Lomb and the other is a medium quartz instrument (Hilger), fig. 1. The former is equipped with interchangeable quartz and glass prisms, and its illuminating system provides an intermediate image to facilitate blocking off portions of the arc.

A set of general filters of 30, 45, 60 and 100 pct transmission mounted on a turret head, is arranged in the path of the light beam to permit control of the light entering the spectrograph, and a masking device in front of the photographic plate serves to mask certain portions of the spectrum for part of the exposure time. A two-step split filter is mounted in front of the slit. Photographing the spectrum through this filter results in spectrum lines which consist of a dark and a light half.

Means of excitation are provided by one ARL 35,000-v spark unit, one ARL 2500-v ac arc unit for current up to 4.5 amp, one 2200-v ac arc unit for current up to 10 amp, and one high frequency ignitor unit with time control. In addition, 220-v dc is available up to 15 amp and 230-v ac up to 10 amp. The cables from the arc stand can be connected to any of the above units by plugging in the appropriate receptacles mounted on a common transite board. The arc

and spark stand is equipped with water-cooled copper clamps and a retractable stop. After each run, the burnt end of the auxiliary electrode is snipped off and fed through against the stop. This limits the length of the auxiliary electrode protruding from the clamps. After retracting the stop, the auxiliary electrode is ready for the next analysis.

The darkroom is equipped with a developing machine in which three tanks, for developer, short stop, and fixing bath, respectively, are suspended in a water bath whose temperature is held between 69.5° and 70.5°F. The 4x10-in. spectrographic plate inserted in a holder is immersed in the tank vertically with the short side up. A motor-driven stirrer, 10 in. long, oscillates close to the emulsion side of the plate at a constant rate of 28 passes per min. In addition to the advantages of controlled temperature and stirring rate, the tank arrangement permits a minimum of exposed developer surface with consequent saving in chemicals.

Eastman spectrum analysis No. 1 plate is used in all quantitative work while Eastman plates Nos. 33, IIIF and, less frequently, 103-0 and I serve in analyses usually of a qualitative nature. Each quantitative plate is calibrated using the two-line method¹ by impressing a special spectrum on the plate and measuring the dark and light portions of several lines of different intensity levels between 2800 and 2850 Å. No new characteristic curve is drawn from these data but the best fitting curve is selected

¹ *Industrial and Engineering Chemistry, Analytical Edition*, vol. 16, No. 11, November 1944, p. 664.

from a family of curves plotted from a large number of data collected over a period of time.

In addition to the calibration spectrum, an appropriate standard is placed twice on each plate. This precaution is taken to recognize and to correct for any shifts of the analytical curve that might arise.

Nickel Alloys

By C. J. NEUHAUS
International Nickel Co., Inc.,
Huntington Works,
Huntington, W. Va.



FIG. 1—View of center portion of Huntington Laboratory of International Nickel Co.

After placing these three control spectra, room is left for 12 sample spectra. Quantitative analysis is based on the internal standard method, and concentration values in percent are derived from the spectrum line transmission values by applying analytical scales to the selected characteristic curve on a calculating board.

Most daily analyses are run for the purpose of furnishing the inspection department with the data necessary for the allocation of the different heats. The following procedures for nickel is given to illustrate this type of analysis:

Sample electrode—cylindrical casting $\frac{7}{8}$ -in. diam, 1 in. long, both ends machined for arcing.

Auxiliary electrode—special grade graphite $\frac{1}{8}$ -in. diam protruding $\frac{1}{4}$ in. from water-cooled clamps.

Spectrograph Bausch & Lomb region 2400 to 3400 Å—slit 30 micron, 4 mm long.

Excitation—ac arc 2200 v, 9 amp, arc gap 0.10 in.

Exposure—30 sec preburning, 60 sec exposure.

Plate—spectrum analysis No. 1.

The spectrum region Si-2519, Ni-2559, Fe-2599 is masked for the first 40 sec of the exposure.

Lines		Analytical Curve Range, Pct	Standard Deviation, Pct
Si 2519*	Ni 2559*	0.015-0.15	2.1
Fe 2599*	Ni 2559*	0.04 -0.3	1.6
Cu 2492	Ni 2500	0.02 -0.2	3.5

Of the lines marked with an asterisk, the light half is photometered.

In the method described above, other sample material than the standard casting such as

heavier gage sheet, strip or tubing may be substituted provided it has approximately the same heat capacity as the standard size sample. If this is not the case, recourse is taken to mounting on tin, thus simulating the standard sample.

Raw materials are analyzed on arrival for certain impurities. As an example, the analysis of tar coke for lead is as follows:

Sample electrode: Grind a 10-g sample to No. 80 mesh; take 0.2 g of this, 0.2 g NH_4Cl and

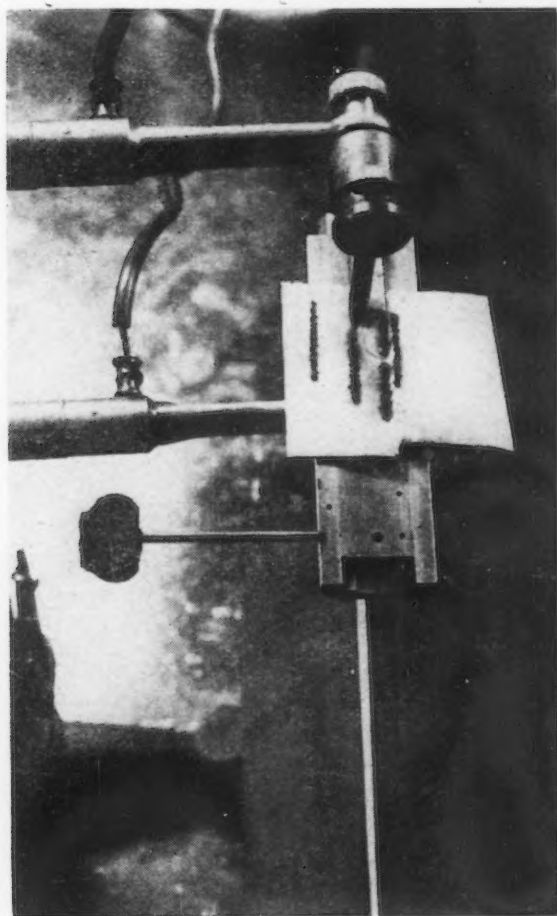


FIG. 2—Top view of arc stand showing surface analysis.

0.075 g iron powder and grind until thoroughly mixed; fill 0.05-g aliquot portions in graphite cups made from graphite, special grade, $\frac{1}{4}$ in. OD, $\frac{5}{8}$ in. long, hollowed out 0.20-in. diam, 0.13 in. deep; and tamp gently.

Auxiliary electrode: Special grade graphite $\frac{1}{8}$ -in. diam protruding $\frac{1}{4}$ in. from water-cooled clamps.

Spectrograph: Bausch and Lomb region 2400-3400 Å; slit 30 micron, 4 mm long.

Excitation: DC 220 v, 5 amp; gap 0.16 in., sample; anode.

Exposure: 90 sec, general filter 45 pct.

		Analytical	Standard
		Curve	Deviation,
Lines	Range, Pct		Pct
Fe 2830	Pb 2833	0.002-0.02	6

The time requirements to complete an analysis of the types described above are as follows: If a full plate of six samples is run in duplicate, which is usual practice, the time per element per sample is 3 to 4 min. A single sample of Inconel can be analyzed for seven elements, in approximately 25 min.

The methods described above have been given because they are in frequent use in the author's laboratory. They cover a large part of the activities; nevertheless, a good many elements such as arsenic and zirconium do not fall in their scope. Neither can strip, tubing or wire of extreme thinness be readily prepared for one of these methods. Special methods are on hand to cover these and other problems.

If thin strip, say 0.005 in., or wire 0.020 in. thick, is to be analyzed for lead, the usual arc methods are not practical. The globule method lacks precision and solid electrodes tend to burn down even with low currents. The solution method is applicable; however, it is slow.

The interrupted arc with the duration of the arc current pulses controlled by a high frequency ignitor current and timer offers a solution. Duration of the discharges as well as the duration of the intervals between them can be controlled in a wide range by means of a Neotrol timer. With short discharges of about six half cycles and intervals, of 30 half cycles and a current of 1 amp, lead can be determined in nickel wire 0.024 in. thick using solid electrodes.

The high frequency ignited arc method also is very useful in determining low concentrations of lead, etc., on the surface of thin sheet or tubes. This can be done by increasing the interval between discharges to, say 120 half cycles, and shift the sample after each discharge of 6 half cycles. The discharge traces of such an analysis can be seen in fig. 2. Obviously this pattern can be extended to cover a larger area of the surface to be examined; the resulting spectrum will be a much more representative record of the average surface conditions than a single exposure could be.

The high frequency ignitor current may also be used in starting semimicro arcs; arcs confined to a small area, say, somewhat less than 1 mm diam. For this type of arc the sample is the cathode and the anode consists of a $\frac{1}{4}$ -in. diam copper rod sharpened to a point. The current through the arc is kept low preferably less than 1 amp. The arc gap is adjusted to approximately 0.005 in. and the arc is started by momentarily applying the high frequency ignitor current. The Neotrol timer is disconnected in this case and push button control substituted. Since the light output is low, the source is placed close to the slit of the Hilger medium spectrograph and a fast plate is used.

If the higher sensitivity of the high frequency ignited arc is not necessary, the arcing area can be reduced somewhat by substituting a low power spark and using an auxiliary silver electrode.

These methods are used for the analysis of inclusions 0.5 to 1 mm diam such as foreign

particles inadvertently rolled in the surface of sheet or strip.

The Hilger medium quartz spectrograph is also very useful in examining small cracks such as may occur in connection with intergranular penetration. In problems of this kind, the sample containing the fracture is made the cathode of a dc arc. A pointed electronickel or copper auxiliary electrode serves as the anode. The latter is made to touch the fracture and the arc is started by withdrawing the auxiliary electrode to form a gap of 0.1 in. The current through the arc is 2 to 3 amp, and the exposure is kept short, 1 to 3 sec, in order to prevent light from metal adjacent to the fracture from diluting the light from the fracture proper. A medium fast

plate such as Eastman No. 33 usually is sufficient.

In conclusion, it should be pointed out that the methods described are those in most frequent use at this time. There are others which might have been included, for instance the briquetted electrode method or spark methods but were omitted because they are less frequently used. Arc methods predominate in this presentation, because elements, such as lead, that play an important role in the metallurgy of nickel alloys and spark methods (generally more desirable from the point of view of precision), are not sufficiently sensitive for these elements at the low concentrations at which they are encountered.

Steel Drum Reconditioning Speeded

THE wartime and postwar shortage of new steel drums has placed a heavy burden on companies engaged in the reconditioning of used drums and the result has been an industry-wide movement toward more efficient cleaning and refinishing methods. One step in this direction has been the use of abrasive blasting to remove all scale, old paint and encrusted materials prior to the inspection and painting operations. The process is suited for high production setups.

Although the design of the blast cleaning machine may vary with different installations, the equipment usually falls into a more or less standard pattern and may consist of one or two machines depending on the type of drum being cleaned.

One machine cleans the outside of the drums as they roll through the abrasive blast. This blast removes all of the exterior paint and rust and the drums are thoroughly cleaned at a rate of 120 to 200 drums per hour.

A second similar machine is used to clean the interior surfaces of the full-removable-cover drums. The open-end drums pass through the machine in an inverted position and a single blasting unit mounted under the drum and set to throw an upward blast, thoroughly cleans the inside of each barrel. This machine turns out a clean drum every 12 sec.

A third blast cleaning machine of the multi-table type, removes all foreign material from the removable covers of the open-end drums. The covers are placed flat on a revolving table that passes the work under a blasting unit. After one pass the covers are turned over and passed



BLAST cleaning machine operated by Kingsland Drum & Barrel Co., Newark, N. J., for cleaning the interior of 30 and 55 gal steel drums. Photo courtesy American Wheelabrator & Equipment Corp.

through the machine a second time to clean the opposite side.

Although no satisfactory method has been devised for cleaning the inside of closed end drums with an abrasive blast, several drum reconditioners are blast cleaning the outside of these drums, thereby presenting a more attractive appearing container.

In each case the work is cleaned by a high velocity blast of chilled iron abrasive hurled by centrifugal force. The cleaning force is supplied by an American Wheelabrator unit which utilizes radial and tangential forces to throw the abrasive at a velocity in excess of 12,000 feet per minute.

In addition to removing all dirt, rust, paint and other foreign material, abrasive blasting slightly roughens the metal. This roughened surface is particularly desirable when drums are refinished by painting or by some other type of applied surface coating because of the tightly adhering bond provided by the matte surface.

Labor Contracts

And

Efficiency

By CARTER C. HIGGINS

*Vice-President, Industrial Relations,
Worcester Pressed Steel Co.,
Worcester, Mass.*

Efficient operation of a plant demands that management maintain certain prerogatives in the management of the plant. Too often, as this article points out, union contracts are signed which contain clauses which tend to nullify the proper exercise of these responsibilities. In addition to a general discussion of labor contracts and plant efficiency, this article also presents a check list of points to watch for in labor contracts if efficient operation and high wage scales are to be achieved.

FOR good industrial relations to exist, management must acknowledge the rights of employees to free expression and human dignity, to job security, fair wages and good working conditions.

Collective bargaining, however, must be based on mutually satisfactory relationships. Employees, therefore, must acknowledge management's responsibility to manage, to achieve efficient production both as to quantity and quality, to control the working force, and to guide the enterprise towards future goals. The management of companies tends to lodge in the hands of the clear thinking and capable, and in some cases these are not members of management.

A certain Philadelphia contract once read: "From time to time . . . the union shall make and enforce new rules and regulations governing the moving of commodities received and delivered by the employer therein which are deemed by the union as necessary to best protect its interests." The employer could confer, the contract stipulated to agree on how long it would take to put the rules into effect (up to 10 days). Further, the contract stated that "An employer may

be permitted to enter the firm's premises on Saturday morning, provided permission to do so is obtained from the union in advance."

American greatness was not achieved by leaders handing over leadership as this contract demanded, to others in a combination and conspiracy against better service to the consuming public. The opposite is true. If government operation can lead to more efficient operations, demands for government operations and controls are not long in coming.

It is not possible to pay greater real wages except through better production. Worcester Pressed Steel Co. is in the custom stamping business. It works against customers' orders to customers' specifications. When a typical job calls for several operations, lasting a few hours each at best, flexibility in assigning work and control by the foreman is absolutely essential to continue to succeed in a highly competitive field.

While toolmakers, maintenance craftsmen, die setters and some others have regular rates, for most employees the job carries the rate. The company cannot guarantee hundreds of lots of material, thousands of dies, or the continuous availability of orders. Press operators are not entitled to run all the jobs on a particular press; they usually spend part of the time as helpers between jobs. Otherwise it would be necessary to send them home, for the company's customers are not noticeably desirous of paying for idle time. The company is paid, not on overall production, but on the work done on particular orders.

A check list of danger points in union contracts which should, in our experience, be avoided in order to pay excellent wages in this plant's community is given in the accompanying table.

It should be pointed out that it is not only contracts that interfere with production, but also the

practices management slips into, such as failure to assign enough authority to foremen, or failures of direct communication. Sometimes organizational changes are necessary.

The principal clauses common to most contracts affecting efficiency are:

(1) The no-strike clause — is enforcement clear?

(2) Management clause—do matters not modified by the contract reside in management's discretion?

(3) Grievance procedure—can this be a time consuming weapon?

(4) Matters for arbitration—can the arbitrator change wage scales or clauses of the contract?

(5) Probationary employees—can unpromising men be weeded out after a fair trial without grievances?

(6) Seniority—does length of service always govern layoff? Must employees be transferred between shifts and departments without regard to production efficiency? Can men be loaned to other departments for rush jobs? Is promotion in accordance with merit?

(7) Hours and overtime—are your hands tied with regard to requiring overtime, slack departments?

(8) Reporting in pay—have you maintained flexibility with fairness?

(9) Wages—do you guarantee average earnings to incentive workers? Do you have a large bonus make up?

(10) Discharge or discipline—is the company's right to discipline for proper cause clear?

(11) Vacation—can you decide to shut part of the plant or all of it if your schedules make it desirable to do so?

(12) Is union activity on company time encouraged?

The most efficient plant in a community can pay the highest wages of the community. If a management expects to pay above average wages, however, it can only do so by getting above average efficiency. In this connection, even more important than individual efficiency is group efficiency. Group efficiency is based on respect for supervisors, free communication, mutual con-

This article is based on an address delivered by Mr. Higgins before the Chapter of the Pressed Metal Institute. —Ed.

sideration and a spirit of industrial democracy.

It is quite possible to base industrial democracy on recognition of the right and obligation of management to plan for and to finally decide how to manage and direct employee groups.

Where management in Europe was more interested in managing prices and in avoiding conflicts than in production efficiency, government has taken over. Enough has been seen of fore-runners of socialistic control in industry-wide bargaining, in coal and steel, to realize that government can do the same here if industrial leaders fail to lead strongly and wisely.

Check These Points In Your Union Contracts

Check list of danger points in union contracts to be awarded in order to be able to pay high wages.

The Best Possible Team—

- ☐ Does your contract prevent your dropping inefficient workers?
- ☐ Does your contract prevent your dropping workers, who though personally efficient, interfere with group efficiency by absence, interruption of work, violation of rules, trouble making?
- ☐ Does your contract force you to keep on new employees of average or less than average ability when you must keep your production at high levels?
- ☐ Does your contract prevent merit ranges among nonincentive workers?
- ☐ Does your contract require that you promote employees on an attendance basis, removing the incentive for younger men to do better than average work?
- ☐ Does your contract and organization make communication difficult, encouraging cliques?

Overpaying—

- ☐ Does your contract force you to pay higher rates than the job is worth?
- ☐ Does your contract require you to pay premiums for normal operation, when extra work is not done?
- ☐ Does your contract restrict overtime when overtime is more efficient?
- ☐ Does your contract permit unnecessary lost time (paid for) visiting between departments? discussing gripes?
- ☐ Does your contract freeze antiquated wage differentials, or differentials offering little incentive for employees to acquire skill? Does it interfere with your improving methods and processes?
- ☐ Does your contract require a great deal of special bookkeeping not otherwise necessary?

Freedom of Leadership—

- ☐ Does your contract recognize management's duty to set forth reasonable shop rules and maintain discipline?
- ☐ Does your contract prevent your supervisors from moving materials, getting wrenches, etc., or from asking men to do odd jobs that come up?
- ☐ Does your contract maintain your supervisors' authority to assign work, enforce safety rules, etc.?
- ☐ Does your contract give the power of setting standards to untrained people? Or permit limitation of output by concerted agreement?
- ☐ Does your contract prevent your setting new rates to meet new conditions?
- ☐ Does it permit rates to be put in or taken off as necessary?
- ☐ Does your contract hinder the purchase of better machines?
- ☐ Does your contract put you in a deep hole on making emergency repairs at desirable times?
- ☐ Does your contract give too much power to committees? Or to an arbitrator?

Some Notes On

Tensile Testing

By FRANK W. SOWA

College of Engineering,
University of Michigan,
Ann Arbor, Mich.

The mechanics of performing a tensile test involves several interesting, not too well understood, phenomena. Two of these, the manner in which work hardening of the steel takes place, and the effect of rate of loading on test data, prompted the author to conduct the test procedures described in this article. Resulting test data are given, together with the author's interpretations. Notch effects are also discussed and are compared with results obtained with unnotched specimens.

IN the study of the cold working of a ductile steel tensile specimen, a series of annealed SAE 1045 steel samples were used. Before submitting these specimens to the tensile test a number of samples were chosen at random and hardness tests were made on outside and on interior surfaces of the specimens, showing a uniform hardness of RB 83 to 84. The various specimens were subjected to a predetermined loading, removed from the testing machine, and further hardness tests were made.

Results of these tests show that there is no hardening effect in any portion of the specimen until after the yield point has been passed. At

13,000-lb load, the center of the specimen showed a hardness of RB 90. The hardness of the specimen decreased rapidly from the center to the surface. In fact, at the 13,000-lb load, the surface of the specimen showed no increase in hardness over the original values. As the loads were increased towards the maximum value, the surface and regions adjacent to the surface began responding to the tensile test. After the maximum load had been reached the work hardening effect for the entire cross-section was almost constant.

Thus, the working hardening of a ductile steel specimen begins at the center of the specimen until loads approaching the maximum are reached. After the center has become strengthened by work hardening, the surface and adjacent regions become work hardened.

To further substantiate these work-hardening results, the following study was made. Annealed SAE 1045 steel specimens were notched to a depth of 0.005 in. completely around the circumference. These specimens were submitted to the same loads as the unnotched specimens. Results show that the yield point was not effected by the notch. Also, at 13,000 lb, the hardness at the center was found to be RB 90 and the hardness at the surface unaffected. These results are identical with those of the unnotched specimen.

As the loads approached the maximum, the work hardening began taking effect at the surface of the specimen with the result that the notch began to show an influence on the specimen. The notch had the effect of concentrating the stresses in a localized area. Thus, work hardening, instead of being distributed along the specimen length, became concentrated at the notched region. Results show that a loss of ductility resulted at the maximum load for the notched specimen. At the maximum load the elongation for an unnotched specimen was 21 pct and the elongation for a notched specimen was 17 pct. The final elongation was also re-

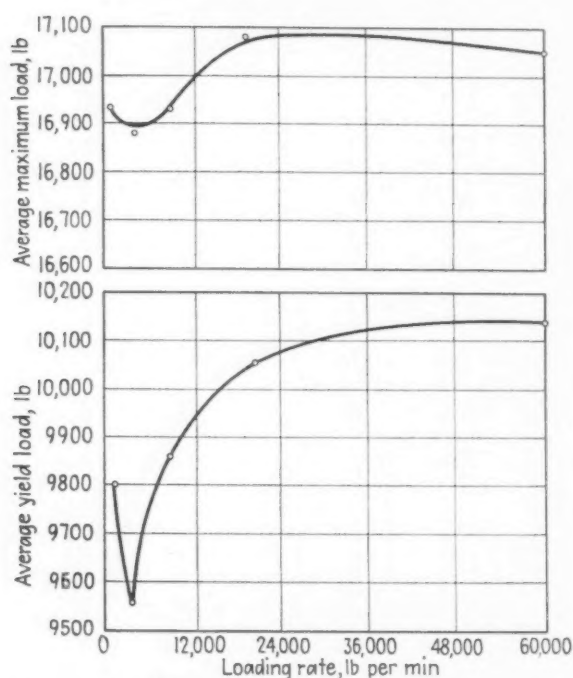


FIG. 1—Effect of loading rate on maximum load and yield load. Platform movements corresponding to loading rates (for yield load determinations) are, 3000 lb per min — 0.011 ipm, 10,000 lb per min — 0.020 ipm, and 60,000 lb per min — 0.125 ipm.

duced due to the notch concentrating the stresses and limiting the amount of work hardening. The work hardening of an annealed SAE annealed steel was studied by the hardness values and diameters for positions along the specimen. The results are shown in tables I and II.

A series of ten specimens (annealed 1045 steel) were tested by repeated loading and unloading up to the maximum load, i.e., the specimens were loaded to 12,000 lb, unloaded and then reloaded to 12,500 lb. This procedure of loading and reloading to a higher load was continued until the maximum load was attained. It was found that the hardnesses of the specimen throughout were the same as those subjected to only one continuous loading to the maximum load. In fact, no perceptible change was noted in the maximum load, elongation, reduction of area, or final breaking load by the use of repeated loading rather than one continuous loading during the test. Thus, the work hardening is not a function of the number of load applications that might be encountered in a tensile test.

Hardness tests conducted on the center and surface locations of test specimens subjected to different rates of loading showed that the work hardening is independent of the testing speed in the testing range used, 1200 lb per min to 60,000 lb per min.

A study was made on annealed SAE 1045 steel to establish the effect of loading rates in a tensile test. Observations were made as follows:

(1) Yield point was affected by the rate of loading and showed an increase of 6.3 pct in yield load at fast rates of loading over the minimum yield load obtained.

(2) Maximum load was affected to some extent by rate of loading and showed an increase of 1.1 pct in yield load at fast rates of loading over the minimum yield load obtained.

(3) Breaking load varied from 14,500 to 14,900 lb and showed no direct correlation to the speed of testing.

(4) Reduction of area remained constant for the various testing speeds.

(5) Elongation remained almost constant for all speeds (± 0.5 pct).

(6) Location and nature of fracture—no difference could be detected in the appearance or location of the fracture for the various testing speeds.

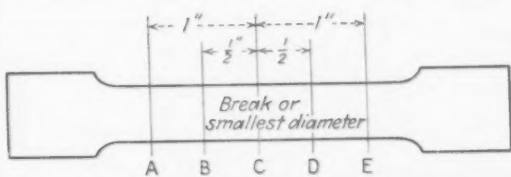
Fig. 1 indicates the effect of rate of loading on maximum load and yield load, respectively. Rates at which readings were taken were 1200, 3000, 8000, 20,000 and 60,000 lb per min.

Along with the use of a uniform rate of loading in tensile tests as presented in fig. 1, tests were made with a combination of loading rates. For example, a loading rate of 60,000 lb per min was used from a zero load to a load of 8500 lb, after which the loading rate was reduced to 8000 lb per min. The yield point obtained as a result of this type of loading corresponded to the yield point when a uniform rate of 8000 lb per min was used throughout the test. Also when a low rate of loading, such as 1200 lb per min, was used at the beginning of the test, and then at 8500-lb

TABLE I

Hardness values at various positions along a standard 0.505-in. tensile specimen of SAE 1045 steel (see sketch) and at varying load conditions.

Test Conditions		Hardness R _c				
		A	B	C	D	E
Yield load 10,000 lb	Center	83	83	83	83	83
	Surface	83	83	83	83	83
13,000 lb	Center	90	90	90	90	90
	Surface	83	83	83	83	83
Max load	Center	95	97	95	92	93
	Surface	93	93	95	97	93
16,000 lb After max	Center	93	93	99	97	93
	Surface	90	91	95	90	89
Breaking load	Center	94	93	97	97	95
	Surface	92	93	98	92	93



load the rate was increased to 60,000 lb per min, the yield point corresponded to that obtained by a uniform 60,000 lb per min rate. Similar tests conducted on maximum loads gave results similar to those obtained on the yield point.

To summarize briefly the results of the study discussed in this article, it can be concluded that:

(1) The interior portion of a ductile steel specimen is cold worked first and the cold working progresses to the outside surfaces as the loads approach the maximum. Due to the manner in which cold working takes place surface roughness does not affect the yield point or maximum load but does affect the elongation, reduction of area, and breaking load. Different rates of loading (1200 to 60,000 lb per min) do not affect the cold working of ductile steel specimens.

(2) Tensile test loading rates used in the yield load and maximum load ranges affect these results. The greatest influence was noted in loading rates of 1200 to 20,000 lb per min. No effects were observed on other tensile properties.

TABLE II

Ductility measurements at various positions along a standard 0.505-in. tensile specimen of SAE 1045 steel and at varying load conditions.

	Specimen Diameter, In.					Elongation, Pct
	A*	B	C	D	E	
Yield load 10,000 lb	0.505	0.505	0.505	0.505	0.505	0.2
13,000 lb	0.500	0.500	0.500	0.500	0.500	3
Max load	0.457	0.457	0.451	0.460	0.467	21
16,000 lb After Max	0.466	0.450	0.414	0.454	0.466	26
Breaking load	0.463	0.444	0.370	0.450	0.464	29

* See sketch in table I for location designations.

The Iron Age Metalworking Buyers' Guide

... A fourth section of the Buyers' Guide is presented herewith. The first section of this directory appeared in the Annual Review Issue, Jan. 1, 1948, p. 208. This guide has been developed to give executives and purchasing agents of the metalworking industry a directory with a much finer breakdown in classifications than has been heretofore available. Additional sections of the guide will be published weekly.

B

(Continued)

Ferracute Machine Co., East Bridgeton, N. J.
Whitney Metal Tool Co., Rockford, Ill.

Brakes, Press, Hand Operated, Precision

Dries & Krump Mfg. Co., 6800 Loomis Blvd., Chicago.
O'Neil-Irwin Mfg. Co., 316 Eight Ave. So., Minneapolis 15.

Brass, or Copper Bronze (See Sheet, Strip, Bars, Castings, etc.)

Brazing, Belts and Trays

Alloy Casting Co., Victor Ave., Champaign, Ill.
Stanwood Corp., 4808 Cortland St., Chicago 39.
Tyler, W. S., Co., 3615 Superior Ave., Cleveland 14.

Brazing, Electric

Baron Steel Co., 4075 Detroit Ave., Toledo 12.
Dickey-Grabler Co., 10302 Madison Ave., Cleveland 2.
Ecco High Frequency Corp., 7018 Hudson Blvd., North Bergen, N. J.
Electric Furnace Co., Salem, Ohio.
Hyndman, A. H., Co. Inc., 9605 Cottage Grove Ave., Chicago 28.
National Electric Welding Machines Co., 1846-1860 N. Trumbull St., Bay City, Mich.
National Stamping Co., 630 St. Jean St., Detroit 14.
Rockwell, W. S., Co., 200 Eliot St., Fairfield, Conn.
Steel Sales Corp., 3352 S. Pulaski Rd., Chicago 23.
Universal Power Corp., 769 Carnegie Ave., Cleveland 15.
Westinghouse Electric Corp., East Pittsburgh, Pa.

Brazing Flux

Air Reduction Sales Co., 60 East 42nd St., New York 17.
Allied Weld-Craft, Inc., 401 W. South St., Indianapolis 4.
American Chemical Paint Co., Ambler, Pa.
Beals, McCarthy & Rogers, Inc. (Distributors), 50 Terrace, Buffalo 5.
Central Steel & Wire Co., 3000 W. 51st St., Chicago 32.
Dockson Corp., 3839 Wabash Ave., Detroit 8.
Eutectic Welding Alloys Corp., 40 Worth St., New York 13.
General Welding & Equipment Co., 268 Northampton St., Boston 18.
Handy & Harman, 82 Fulton St., New York 7.

Hollup Corp., 4700 W. 19th St., Chicago 50.
The International Nickel Co., Inc., 67 Wall St., New York 5.

The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7.

Linde Air Products Co., 30 E. 42nd St., New York 17.

Marquette Mfg. Co., Inc., 307 E. Hennepin St., Minneapolis 14.

Modern Engineering Co., 3409 Pine Blvd., St. Louis 3.

National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6.

Phillips, C. E., & Co., 2750 Poplar St., Detroit 8.

Seafie Co., Oakmont, Pa.

Sherman & Co., 196 Canal St., New York 13.

Steel Sales Corp., 3352 S. Pulaski Rd., Chicago 23.

Universal Power Corp., 769 Carnegie Ave., Cleveland 15.

Westinghouse Electric Corp., East Pittsburgh, Pa.

Brazing Furnaces (See Furnaces, Brazing)

Brazing Rods and Alloys

Air Reduction Sales Co., 60 East 42nd St., New York 17.
Aladdin Rod & Flux Mfg. Co., 1300 Burton, S. E., P. O. Box 935, Madison Sq. Sta., Grand Rapids 7.
Allied Weld-Craft, Inc., 401 W. South St., Indianapolis 4.
Beals, McCarthy & Rogers, Inc. (Distributors), 50 Terrace, Buffalo 5.
Eutectic Welding Alloys Corp., 40 Worth St., New York 13.
Handy & Harman, 82 Fulton St., New York 7.
International Nickel Co., Inc., 67 Wall St., New York 5.
Marquette Mfg. Co., Inc., 307 E. Hennepin St., Minneapolis 14.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6.
Phillips, C. E., & Co., 2750 Poplar St., Detroit 8.
Rall Supply Co., 110 E. 42nd St., New York 17.
Sherman & Co., 196 Canal St., New York 13.
Steel Sales Corp., 3352 S. Pulaski Rd., Chicago 23.
Westinghouse Electric Corp., East Pittsburgh, Pa.

Brick, Fire Clay (See Brick, Refractory)

Brick, Refractory

Alabama Clay Products Co., Martin Bldg., Birmingham 3.

Bellevue Industrial Furnace Co., 2974 Bellevue Ave., Detroit 7.

Botfield Refractories Co., Swanson & Clymer St., Philadelphia 47.

Carborundum Co., Refractories Div., Perth Amboy, N. J.

Climax Fire Brick Co., Climax, Pa.

Corhart Refractories Co., Inc., 1600 West Lee St., Louisville 10.

Egan, Webster & Co., Inc., Koppers Bldg., Pittsburgh 19.

Electric Refractories & Alloys Corp., Vars Bldg., 344 Delaware Ave., Buffalo 2.

Green Fire Brick, A. P., Co., Mexico, Mo.

Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22.

Haws Refractories Co., Johnstown, Pa.

Koppers Company, Inc., Koppers Bldg., Pittsburgh 19, Pa.

Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis 1.

Lavino, E. J., and Co., 1528 Walnut St., Philadelphia 2.

Massillon Refractories Co., Massillon, Ohio.

Pliabrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago 14.

Quigley Co., Inc., 527 Fifth Ave., cor. 44th St., New York 17.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Taylor Sons, Chas., Co., 706 Burns St., Cincinnati 14.

Titanium Alloy Mfg. Co., Box C, Bridge Station, Niagara Falls, N. Y.

U. S. Stoneware Co., P. O. Box 350, Akron, Ohio.

Walz & Krenzer Inc., 250 Mount Hope Ave., Rochester 7.

Brighteners, Electroplating

Beam-Knodel Co., 195 Lafayette St., New York 12.

Du Pont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.

Enthone, Inc., 442 Elm St., New Haven 11, Conn.

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Bright Nickel Plating (See Nickel Plating, Bright)

Brinell Testing Machines (See Hardness Testers)

Briquetting Machines (See also Briquetting and Baling Presses)

Briquetting and Baling Presses

American Pulverizer & Crusher Co., 1255 Mackland Ave., St. Louis 10.

Bliss, E. W., Co., 455 Amsterdam Ave., Detroit 2.

BUYERS' GUIDE

Dempster Bros., Inc., Springdale Ave., Knoxville, Ky.

Galland-Henning Mfg. Co., 2760 31st St., Milwaukee 7.

Harris Foundry & Machine Co., Russell Bldg., Cordele, Ga.

Milwaukee Foundry Equipment Co., 3250 Pierce St., Milwaukee 4.

Baldwin Locomotive Works, Eddystone Div., Eddystone, Pa.

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.

Komarek-Greaves & Co., Mozart St., Chicago 18.

Milwaukee Foundry Eqp't. Co., Pierce St., Milwaukee.

Broaches and Broaching Fixtures (See Tools, Broaching)

Broaching Machines

Aaron Machinery Co., Inc., 45 Crosby St., New York 12.

Botwinik Bros. of Mass., Inc., 5 Sherman St., Worcester 1, Mass.

Cincinnati Milling Grinding Machines, Inc., Cincinnati 9.

Donahue Steel Products Co., Inc., 1919 W. 74th St., Chicago 36.

Espen-Lucas Machine Works, Front St. & Girard Ave., Philadelphia 23.

Interstate Machinery Co., 1435 W. Pershing Rd., Chicago 9.

Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.

Machinery Liquidating Co., 2306 W. Warren Ave., Detroit 8.

Miles Machinery Co., 2025 E. Genesee Ave., Saginaw, Mich.

Oilgear Co., 1303A W. Bruce St., Milwaukee 4.

Ritterbush & Co., Inc., 50 Church St., New York 7.

Simmons Machine Tool Corp., Albany 1.

Bronze (See Sheet, Strip, Bars, Castings, etc.)

Bronze Powders (See Metal Powders, Bronze)

Bronze Welding Rods (See Welding Rods, Bronze)

Brushes, Cleaning

Beals, McCarthy & Rogers, Inc. (Distributors), 50 Terrace, Buffalo 5.

Beam-Knodel Co., 195 Lafayette St., New York 12.

Black & Decker Mfg. Co., Towson, Baltimore 4.

Disston & Sons, Henry, Inc., 4619 Tacony, Tacony, Philadelphia 35.

Eenthone, Inc., 442 Elm St., New Haven 11, Conn.

Fuller Brush Co., Fuller-Gript Div., 3582 Fuller Park, Hartford 2, Conn.

Hanson-Van Winkle-Munning Co., Matawan, N. J.

National Machine & Tool Co., 626 N. Mechanic Street, Jackson, Mich.

Osborn Mfg. Co., Inc., Hamilton Ave., Cleveland.

Pittsburgh Plate Glass Co., Brush Div., 3221 Frederick Ave., Baltimore 29.

Schaefer Brush Mfg. Co., 1039 S. Second St., Milwaukee 4.

Brushes, Industrial

Fuller Brush Co., Fuller-Gript Div., 3582 Fuller Park, Hartford 2, Conn.

Holcomb, J. L., Mfg. Co., Holcomb St., Indianapolis.

National Brush Co., Aurora, Ill.

Osborn Mfg. Co., Inc., Hamilton Ave., Cleveland.

Pittsburgh Plate Glass Co., Brush Div., Frederick Ave., Baltimore 29.

Spiral Brushes, Inc., 3000 E. 91st St., Cleveland 4.

Brushes, Machine

Fuller Brush Co., Fuller-Gript Div., 3582 Fuller Park, Hartford 2, Conn.

Haisler Bros. Co., Inc., Schiller St., Chicago 10.

Holcomb, J. L., Mfg. Co., Holcomb St., Indianapolis.

Wanted:

Corrections for Buyers' Guide

• Every company in the metalworking industry is urged to check this and subsequent sections of the new Iron Age Metalworking Buyers' Guide, and promptly send in all necessary corrections and additions to assure complete accuracy in the first reprint of the directory. Corrections should be sent to THE IRON AGE, Attention Buyers' Directory, 100 E. 42nd St., New York 17.

Maendler Brush Mfg. Co., St. Paul, Minn.

Osborn Mfg. Co., Inc., Hamilton Ave., Cleveland.

Pittsburgh Plate Glass Co., Brush Div., Frederick Ave., Baltimore 29.

Brushes, Tampico, Wire

Allied Industrial Products Co., 620 North Michigan Ave., Chicago 11.

Beals, McCarthy & Rogers, Inc. (Distributors), 50 Terrace, Buffalo 5.

Beam-Knodel Co., 195 Lafayette St., New York 12.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

Eenthone, Inc., 442 Elm St., New Haven 11, Conn.

Formax Mfg. Co., 3000 Bellevue St., Detroit 7.

Fuller Brush Co., Fuller-Gript Div., 3582 Fuller Park, Hartford 2, Conn.

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Manderscheid Co., 810 Fulton St., Chicago 7.

National Machine & Tool Co., 626 N. Mechanic Street, Jackson, Mich.

Osborn Mfg. Co., Inc., Hamilton Ave., Cleveland.

Pittsburgh Plate Glass Co., Brush Div., Frederick Ave., Baltimore 29.

Puritan Mfg. Co., Waterbury, Conn.

Schaefer Brush Mfg. Co., 1039 S. Second St., Milwaukee 4.

Sommers Bros. Mfg. Co., 3439-41-43 No. Broadway, St. Louis 7.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

U. S. Grinding Wheel Co., 180 Lafayette St., New York 13.

Worcester Wire Works Div., National Standard Co., Worcester 3, Mass.

Buckets, Clamshell

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh 1.

Brosius, E. E., Co., 19th St. & P. R. R., Sharpsburg, Pittsburgh 15.

Hyster Co., Clackamas St., Portland, Ore.

Reliance Steel Products Co., McKeesport, Pa.

Buckets, Dump

Brosius, E. E., Co., 19th St. & P. R. R., Sharpsburg, Pittsburgh 15.

Clyde Iron Works, Duluth, Minn.

Gifford-Wood Co., Hudson, N. Y.

Koven, L. O., & Bros., Inc., Ogden Ave., Jersey City.

Link-Belt Co., Pershing Rd., Chicago.

Whiting Corp., Lathrop Ave., Harvey, Ill.

Buckets, Single Line

Brosius, E. E., Co., 19th St. & P. R. R., Sharpsburg, Pittsburgh 15.

Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14.

Buffing Machines (See also Polishing Machines)

Aaron Machinery Co., Inc., 45 Crosby St., New York 12.

Allied Industrial Products Co., 620 North Michigan Ave., Chicago 11.

Beam-Knodel Co., 195 Lafayette St., New York 12.

Black & Decker Mfg. Co., Towson, Baltimore 4.

Botwinik Bros. of Mass., Inc. (New and Used), 5 Sherman St., Worcester 1, Mass.

Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.

Chicago Pneumatic Tool Co., 8 E. 44th St., New York 17.

Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18.

Diehl Mfg. Co., 1134 Finderne Ave., Somerville, N. J.

Excelsior Tool & Machine Co., 30th to Ridge to Jefferson Ave., East St. Louis, Ill.

General Machy. & Equip't. Co., 180 So. 15th St., Harrisburg, Pa.

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Indianapolis Machy. & Sup. Co. (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

Interstate Machinery Co., 1435 W. Pershing Rd., Chicago 9.

Machinery Liquidating Co., 2306 W. Warren Ave., Detroit 8.

Mall Tool Co., 7801 S. Chicago Ave., Chicago 19.

Manderscheid Co., 810 Fulton St., Chicago 7.

Martindale Electric Co., Cleveland 7.

Miles Machinery Co., 2025 E. Genesee Ave., Saginaw, Mich.

Nankervis, Geo. L., Co., 5442 Second Blvd., Detroit 2.

Porter-McLeod Machine Tool Co., Inc., Hatfield, Mass.

Puritan Mfg. Co., Waterbury, Conn.

Sommers Bros. Mfg. Co., 3439-41-43 No. Broadway, St. Louis 7.

Standard Electrical Tool Co., 2505 River Rd., Cincinnati 4.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Udylite Corp., 1600 Grand Blvd., Detroit 11.
U. S. Electrical Tool Co., 1050 Findlay St., Cincinnati 14.
Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis.

Buffing, Polishing Compositions

Allied Industrial Products Co., 620 North Michigan Ave., Chicago 11.
Barnsdall Tripoli Corp., Seneca, Mo.
Beam-Knodel Co., 195 Lafayette St., New York 12.
Bias Buff and Wheel Co., Division Riegel Textile Corp., 3464-66 Hudson Boulevard Jersey City 7.
Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18.
Formax Mfg. Co., 3000 Bellevue St., Detroit 7.
Fuller Brush Co., Fuller-Gript Div., 3582 Fuller Park, Hartford 2, Conn.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., P. O. Box 457, Haverhill, Mass.
Kocour Co., 4800 S. St. Louis Ave., Chicago.
Manderscheid Co., 810 Fulton St., Chicago 7.
Nankervis, Geo. L., Co., 5442 Second Blvd., Detroit 2.
Puritan Mfg. Co., Waterbury, Conn.
Sommers Bros. Mfg. Co., 3439-41-43 No. Broadway, St. Louis 7.
Stevens, Frederic B., Inc., 510 Third St., Detroit 26.
U. S. Grinding Wheel Co., 180 Lafayette St., New York 13.
Worthington Co., 317 Dwight St., Springfield, Mass.
Wyandotte Chemicals Corp., Wyandotte, Mich.

Buffing, Polishing Wheel Rakes

Allied Industrial Products Co., 620 North Michigan Ave., Chicago 11.
Beam-Knodel Co., 195 Lafayette St., New York 12.
Bias Buff and Wheel Co., Division Riegel Textile Corp., 3464-66 Hudson Boulevard Jersey City 7.
Formax Mfg. Co., 3000 Bellevue St., Detroit 7.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Manderscheid Co., 810 Fulton St., Chicago 7.
Nankervis, Geo. L., Co., 5442 Second Blvd., Detroit 2.
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford 1, Conn.
Puritan Mfg. Co., Waterbury, Conn.
Sommers Bros. Mfg. Co., 3439-41-43 No. Broadway, St. Louis 7.
Stevens, Frederic B., Inc., 510 Third St., Detroit 26.
U. S. Grinding Wheel Co., 180 Lafayette St., New York 13.

Buffing, Polishing Wheels

Allied Industrial Products Co., 620 North Michigan Ave., Chicago 11.
Atkins, E. C., & Co., 406 S. Illinois St., Indianapolis 9.
Bacon Felt Co., 22 Grove Pl., Winchester, Mass.
Beam-Knodel Co., 195 Lafayette St., New York 12.
Bias Buff and Wheel Co., Division Riegel Textile Corp., 3464-66 Hudson Boulevard Jersey City 7.
Columbian Rope Co., Inc., Allied Products Div., Auburn, N. Y.

Formax Mfg. Co., 3000 Bellevue St., Detroit 7.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Mall Tool Co., 7801 S. Chicago Ave., Chicago 19.
Manderscheid Co., 810 Fulton St., Chicago 7.
Nankervis, Geo. L., Co., 5442 Second Blvd., Detroit 2.
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford 1, Conn.
Puritan Mfg. Co., Waterbury, Conn.
Rhodes, James H. & Co., 157 W. Hubbard St., Chicago 10.
Sommers Bros. Mfg. Co., 3439-41-43 No. Broadway, St. Louis 7.
Stevens, Frederic B., Inc., 510 Third St., Detroit 26.
Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis.
Worthington Co., 317 Dwight St., Springfield, Mass.

Buildings, Steel

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh 1.
International Derrick & Eqt. Co., Michigan Ave., Columbus 8, Ohio.
Levinson Steel Sales Co., 33 Pride St., Pittsburgh 19.
Maryland Metal Bldg., Co., Race St., Baltimore 30.
Steelcraft Mfg. Co., Blue Ash Rd., Ross-moyné (Cincinnati), Ohio.

Bulldozers

Donahue Steel Products Co., Inc., 1919 W. 74th St., Chicago 36.
Interstate Machinery Co., 1435 W. Pershing Rd., Chicago 9.
Kane & Roach, Inc., Syracuse.
Keckley, O. C., Co., Springfield, Ill.
Kling Bros. Engineering Wks., 1830 N. Kostner Ave., Chicago 51.
Le Tourneau, R. G., Peoria, Ill.
Miles Machinery Co., 2025 E. Genesee Ave., Saginaw, Mich.
Ritterbush & Co., Inc., 50 Church St., New York 7.
Simmons Machine Tool Corp., Albany 1.
Trackson Co., 3333 S. Chase Ave., Milwaukee 7.
West Penn Machinery Co., 1210 House Bldg., Pittsburgh 22.
Williams, White & Co., 8th St. & Third Ave., Moline, Ill.
Wood, R. D., Co., Conshohocken, Pa.

Burners

Alumatone Corp., 1523 Grande Vista Blvd., Los Angeles 23.
Hauck Mfg. Co., 108-118 Tenth St., Brooklyn 15.
Hones, Charles A., Inc., 121 S. Grand Ave., Baldwin, N. Y.
Industrial Heating Equip. Co., 3570 Fremont Pl., Detroit 7.
Iron Fireman Mfg. Co., 3170 W. 106th St., Cleveland 11.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2.
Mahr Mfg. Co., Div. Diamond Iron Works, 1729 No. 2nd St., Minneapolis 11.
Mid Continent Metal Products Co., 1960 N. Clybourn Ave., Chicago 14.
National Airoil Burner Co., Inc., E. Sedgley Ave., Philadelphia 34.

Rockwell, W. S., Co., 200 Eliot St., Fairfield, Conn.
Vapofier Corp., 10316 South Throop St., Chicago 43.
Vulcan Corp., 1701 Arch St., Philadelphia 3.
Zurn, A. J., Mfg. Co., Erie, Pa.

Burners, Oil or Gas

Agerstrand Corp., Muskegon, Mich.
American Radiator & Standard Sanitary Corp., P. O. Box 1226, Pittsburgh 30.
Bellevue Industrial Furnace Co., 2974 Bellevue Ave., Detroit 7.
Delco Appliance Div., General Motors Corp., 391 Lyell Ave., Rochester 1, N. Y.
Eclipse Fuel Engineering Co., 814 S. Main St., Rockford, Ill.
Enthone, Inc., 442 Elm St., New Haven 11, Conn.
Gilhams, H. S., & Co., 2312 Lincoln-Liberty Bldg., Philadelphia 7.
Gordon, Claud S., Co., 3000 So. Wallace St., Chicago 16.
Hones, Charles A., Inc., 121 S. Grand Ave., Baldwin, N. Y.
Industrial Heating Equip. Co., 3570 Fremont Pl., Detroit 7.
Iron Fireman Mfg. Co., 3170 W. 106th St., Cleveland 11.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2.
Koppers Co., Inc., Koppers Bldg., Pittsburgh 19.
Linde Air Products Co., 30 E. 42nd St., New York 17.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22.
Mahr Mfg. Co., Div. Diamond Iron Works, 1729 No. 2nd St., Minneapolis 11.
Mid Continent Metal Products Co., 1960 N. Clybourn Ave., Chicago 14.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4.
Rockwell, W. S., Co., 200 Eliot St., Fairfield, Conn.
Sunbeam Stewart Ind. Fnc. Div., Sunbeam Corporation, 4433 W. Ogden Ave., Chicago 23.
Surface Combustion Corp., 2375 Dorr St., Toledo 1.
Vapofier Corp., 10316 South Throop St., Chicago 43.
Vulcan Corp., 1701 Arch St., Philadelphia 3.

Burners, Pulverized Coal

Beam-Knodel Co., 195 Lafayette St., New York 12.
Hartford Steel Ball Co., New Park Ave. & Jefferson St., Hartford 6.
Puritan Mfg. Co., Waterbury, Conn.
Sommers Bros. Mfg. Co., 3439-41-43 No. Broadway, St. Louis 7.

Burnishing and Polishing Balls

Abbott Ball Co., Hartford, Conn.
Beam-Knodel Co., 195 Lafayette St., New York 12.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Hartford Steel Ball Co., New Park Ave. & Jefferson St., Hartford 6, Conn.
Puritan Mfg. Co., Waterbury, Conn.
Sommers Bros. Mfg. Co., 3441 N. Broadway, St. Louis 7.

(CONTINUED ON PAGE 120)

New Equipment . . .

A multi-operations threading machine for production of small screws, nuts, and bushings, a hydraulic metal cutting saw, radio frequency generators, an electron diffraction instrument for measuring surface conditions of metals and plastics, and a lithium atmosphere furnace are featured herein. Also discussed are threadless malleable fittings, anonizing process for aluminum, and several material handling trucks.

Screw Threading Machine

REDUCTION of idle time through overlapping of operations is claimed for an automatic screw threading machine developed by *Brown & Sharpe Mfg. Co.*, Providence, R. I., for production of small screws, nuts and bushings. The work spindle and threading spindle rotate in the same direction at different speeds. This difference in speeds is said to permit

speeds, 2000 to 91 rpm, provided by difference in speed of the work and threading spindles. The machine takes stock to $\frac{3}{8}$ in. diam and threads any length to 1 in.

Single Phase Induction Motor

A SINGLE-PHASE squirrel cage capacitor-start motor of new design has been manufactured by *Westinghouse Electric Corp.*, 306 4th Ave., Pittsburgh 30. Bearings are prelubricated and are said to require no attention for 5 years. Starting-torque characteristics have been improved to give performance comparable to repulsion-start, induction-run motors. This design avoids the use of wound armature, brushes, brush holders and short-circuiting devices. The capacitor-start motor is electrically reversible with characteristics fixed. An improved centrifugal switch is used on motors rated 1 to 3 hp inclusive at 1750 rpm and $1\frac{1}{2}$ to 5 hp at 3600 rpm. On larger ratings, or special mountings, to which the switch is not readily adapted, a relay is used. The switch consists of a rotating governor on the shaft which actuates a set of contacts in one of the end brackets. Capacitors are mounted in the conduit box. A stator winding using lap wound coils grouped to provide the required distribution is employed.

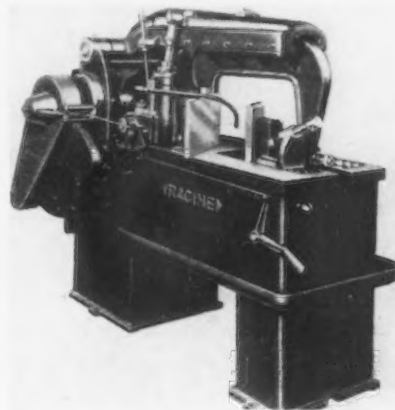
Lightweight Electric Motor

CALLED the Workhorse, an electric motor, manufactured by *Crozier Machine Tool Co.*, Hawthorne, Calif., is heavy duty and/or long hour of capacitor type, single phase, $\frac{1}{2}$ hp, 115/230 v. Due to its low slippage, it is reported 2 pole develops 3520 rpm, 4 pole, 1760 rpm. It draws 6.8 amp on 110 v and 3.4 amp on 220 v, oper-

ating on either 50 or 60 cycles. The case is of 16 gage sheet steel. The motor is lubrication-sealed for life, can run in any position, operating at 40° temp. A cooling system circulates air between the frame and the laminations.

Metal Cutting Machine

DESIGNATED the Oil Cut model, a hydraulic metal cutting saw designed by *Racine Tool & Machine Co.*, Racine, Wis., has



been developed for cut-off work in metal working shops on all types of metal in sizes up to 10 x 10 in. Feed and pressure control, rapid traverse and the lift on the non-cutting stroke are hydraulically operated. A lever located at the front of the machine regulates rapid traverse and clutch. A push-pull lever allows a gradual lowering of the frame and blade for measuring the cut-off lengths of stock.

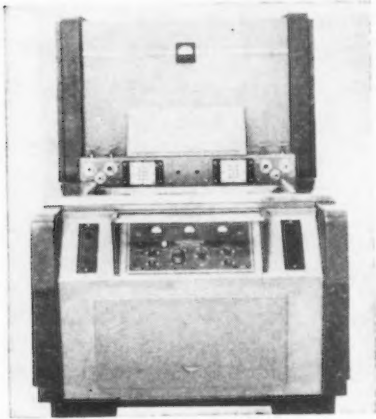
RF Generators

DESIGNED for the metalworking industry, three 20-kw 450-kc radio frequency generators now built by *Westinghouse Electric Corp.*, 306 4th Ave., Pittsburgh 30, are said to consolidate



the die or tap to cut at the required surface speed for threading while the work rotates at suitable speed for turning or other operations. Threading dies are backed off by automatic stopping of the threading spindle. A slotting mechanism provides for slotting screws and similar parts. When the machine is used for tapping, the transfer arm of the slotting mechanism provides for drilling the hole in the work previous to tapping. Speeds are as follows: Sixteen work spindle speeds from 5000 to 454 rpm; 32 threading spindle speeds from 7000 to 545 rpm. This gives 32 changes of thread cutting

generator, worktable or sink, current transformers and water fittings into one unit. Type A generator is a single position unit with built-in worktable and transite table top suitable for brazing



and soldering. Type B is a single position unit for hardening applications with a built-in work sink, two sets of water fittings and a current transformer. Type C is a two position unit suited to soldering, brazing and hardening applications and combines a built-in work sink, two sets of coil and quench water fittings, and two current transformers with automatic transfer switch to provide two independently controlled work positions. Stepless power output control is from 0 to 20 kw.

Low Alloy Steel Electrode

DESIGNATED No. 111HT electrode, Hobart Bros. Co., Troy, Ohio, has released an electrode designed for use on high tensile, low alloy steels in the downhand positions such as deep groove, positioned and horizontal fillet welds. Spatter loss is said to be low with rate of metal deposit high. Physical properties are: Tensile strength, 70,000 to 80,000 psi; yield point, 65,000 to 70,000 psi; elongation, 25 to 30 pct. These electrodes are available in 3/16 and 1/4-in. diam in 18-in. lengths.

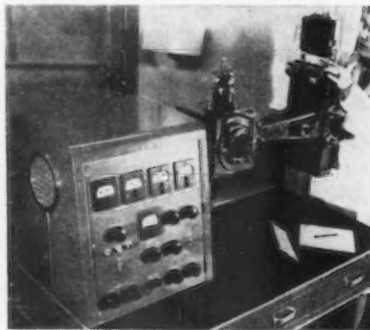
Filtering or Diffusing Metal

A SPONGE-LIKE metal available in a variety of porosity ranges for the filtering of liquids or the control of flow of liquids and gases, made in shapes to meet particular applications, is announced by Henry L. Crowley & Co., Inc.,

West Orange, N. J. This powder metallurgy product is available in various metals or alloys to meet non-corrosive requirements. The manufacturer states it can be fabricated into disks or flat plates, cylinders, truncated cones, plugs or inserts and other shapes meeting mechanical considerations. Sizes range from small plugs or inserts fitting into fuel lines of internal combustion engines to large filter units. Its characteristics are said to make it suitable for filtering of liquids and solids of various densities, the diffusing or atomizing of liquids or gases, control of rate of flow, separation of liquids of different specific gravities, and the isolation of flame or fire. The material is fabricated only to special order.

Diffraction Instrument

DESIGNED to aid in the observation and measurement of surface conditions of metals.



ceramics and plastics, an electron diffraction instrument released by General Electric Co., Schenectady 5, N. Y. is recommended for investigating problems associated with corrosion, catalysts, lubricants, metallurgy, pigments, surface deposits and graphite. It differs from the X-ray diffraction instrument, which analyzes thick specimens, in that the instrument shows the crystal structure of surfaces and thin specimens up to 500 Angstrom units. In operation, a beam of electrons is directed at the specimen and any resulting diffraction pattern is photographed. The pattern consists of rings whose diameter, intensity and orientation provide information for determining composition, orientation and size of crystals present. Specimens ranging from 0.1 to 4 in. in diameter may be examined.

Bright Dip for Copper

A SOLUTION for bright dipping of copper and copper alloys has been introduced by Ros-saul Co., 119 W. 63rd St., New York 23. Known as Copper-Brite, the solution is reported to remove oxides, leave the metal bright and shiny, resistant to future tarnish or discoloration. Metal is left passivated and ready for the next operation. Copper-Brite is non-toxic, non-fuming and safe for the worker to handle, it is claimed. Used at room temperature in acid resistant still tanks, Copper-Brite requires only a dip and clear water rinse. Only 5 sec of immersion are required for a bright dip; 3 min for removal of heat scale. It will not discolor silver solder. The solution is packaged in 1-gal bottles and 13-gal carboys.

Automatic Flexible Welder

A DVANTAGES of the Union-melt welding process have been made available anywhere in a shop, on any work that can be suitably positioned, with the automatic flexible welder recently announced by Linde Air Products Co., 30 E. 42nd St., New York 17. The welder can be used as a primary welding tool in a small welding shop or as a supplementary tool for fully mechanized installations. The special feature of this machine is that the welding nozzle, at the end of a 20-ft long flexible hose, when held in the operator's hands, can be moved from one weld to



another without stopping to set up track, carriage, or other guiding equipment. The flexible hose, connecting the nozzle to the main machine assembly, contains the welding current cable and two tubes through which the welding rod and the granular material are fed. Bare welding rod of any size

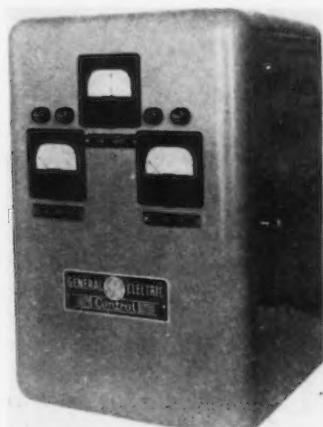
up to 5/32 in. diam in the standard 25-lb coils can be used in the machine. Granular welding composition is continuously supplied to the welding nozzle by compressed air from a storage tank included on the main machine assembly. Also included in the main machine assembly are a welding head, the control unit, and a rod reel. All controls are operated from a small portable switch box. The welder has a capacity of 900 amp, ac or dc. Compressed air at 35 psi pressure is required.

DC Rectifiers

PRIMARILY intended for use in electroplating and electrolytic cleaning, low voltage, high current rectifiers made available by *Mellaphone Electronic Rectifier Co., Inc.*, Rochester 2, N. Y., are also recommended as a source of power for production testing and running in of 6 and 12 v dc motors. Selenium rectifier elements are said to provide a number of advantages in operation. Stepless control from zero to maximum setting is governed by a heavy-duty variable voltage transformer. Units are equipped with 4½-in. ammeter and voltmeter and protection against overloads and failure of ventilation system.

Amplidyne Control Unit

FOR use on steel mill and similar mill and processing line control applications where speed, current, or voltage regulation are



required, *General Electric Co.*, Schenectady 5, N. Y., has announced the amplidyne control unit which contains all adjusting rheostats, capacitors, rectifiers, and instruments required for the amplidyne regulating circuit. In addition to

this function, the control provides motor speed limit control, field forcing during acceleration and deceleration, and stabilizing functions. The control utilizes small rheostats in place of conventional resistor units. It is mounted on the front of the main panel board, recessed in the panel, or mounted back of the board.

Flexible Shaft Machines

FLEXIBLE shaft machines brought out by *Stow Mfg. Co.*, Binghamton, N. Y., feature motor and variable speed drive mechanism contained in a streamlined housing which covers all moving parts. The flexible shaft is driven by V-belt stepped pulleys. Speed changes and belt adjustment are made by turning an eccentric

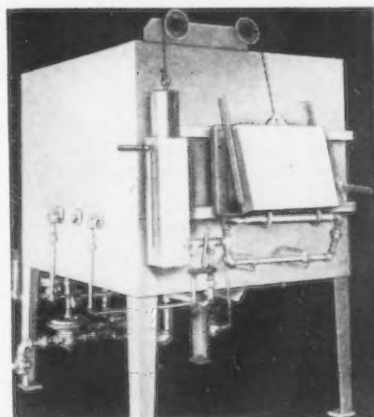


spindle which is locked in position by a knob. The 6-ft flexible drive shaft has an oil-resistant casing and coil reinforcement. The handpiece is equipped with a detachable wheel arbor to permit wider adaptability of tools and attachments. A choice of mounting, power and speed range is offered. Pedestal type is equipped with a ½-hp motor; suspended type with ½, ¾ or 1-hp motor; low-mount pedestal type with ¾ or 1-hp motor; bench type with ½-hp motor. Speeds for all ½-hp units are 1725, 2700, 4450 and 6900 rpm. Speed for ¾ and 1-hp units are 1150, 2100, 3450 and 5750 rpm.

Lithium Atmosphere Furnace

DEVELOPED to overcome variations in the atmosphere and to make control of heating and atmosphere positive and unailing,

requiring no critical manual control or supervision, an atmosphere universal batch furnace has been announced by *Lithium Co.*, 111 Sylvan Ave., Newark 4, N. J. It



is reported that by introducing lithium vapor with the usual carrier gas into the heating chamber of the furnace, complete control of the atmosphere is effected right at the work. The protection of the lithium vapor extends, it is claimed, to the instant of quenching or during air cooling, so that there can be no oxidation or change in surface analysis of the metal. Lithium atmosphere minimizes, and frequently eliminates, after cleaning and even machining, it is reported. The furnace is suitable for heating in a temperature range from 1200° to 2100°F, providing fast, uniform heating under predetermined, automatically controlled conditions in neutral annealing, normalizing, hardening, spheroidizing, carburizing, carbon restoration and brazing.

Equalizing Slings

DESIGNED to lift odd-shaped and unbalanced loads level or at predetermined angles, for moving simple loads and for working in confined spaces, an improved model of the Adjust-A-Leg equalizing sling has been announced by *Caldwell Co.*, 1830 Camp Ave., Rockford, Ill. They are available in capacities ranging from ¾ to 12 tons, with a safety factor of 5. The sling consists of an equalizing unit equipped with wire rope. The equalizing unit is made up of a sheave carried by a spring-mounted axle, and a pair of brake shoes. The rope, which lays over the sheave in the V-shaped groove, has a hook attached to each end, forming two legs. When the rope is

hooked to the load, the legs readily lengthen or shorten themselves, according to the weight distribution of the load. Two units may be placed on one crane hook for three or four-point suspension.

Special-Service Truck

DESIGNED for heavy work over rough terrain and particularly suitable for heavy construction, the new truck of *Milford Crane & Machine Co.*, Milford, Conn., features several innovations in design. A front axle group technique, interconnected by equal-



izing beams and two steering axles provides two sets of front wheels in tandem arrangement. The cab is arranged so that the operator faces forward when operating the truck and turns in his seat to operate the winch or crane controls. Cranes, winches or other special equipment can be installed on the chassis of the unit.

Aluminum Coating

FOR protecting aluminum surfaces and yet maintaining its natural color, the anodizing process, a simple immersion method of protection has been announced by *Colonial Alloys Co.*, Ridge Ave. and Crawford St., Philadelphia 29. Aluminum that has been etched or mechanically, electrolytically, or chemically polished, as well as aluminum as-furnished by the mill, can be treated by this process without noticeably changing the appearance. The coating, which resembles an anodized coat, is compact, protective, at the same time, transparent. Anodized coats are said to have good abrasion resistance and are resistant to smudging, oxidizing, finger-marks, ordinary handling and high temperatures. The process consists of immersing the cleaned aluminum into the hot anodizing solution for a few seconds to a few minutes, then rinsing. The equipment can be ordinary steel and many items

can be handled in batch, as in baskets. Another feature of this transparent protective coating is that it can be a base for paints and lacquers.

Threadless Malleable Fittings

Threadless malleable fittings made for brazed pipe joints have been introduced by *Stanley G. Flagg & Co., Inc.*, 1427 Chestnut St., Philadelphia. Known as Flagg-Flow fittings, they are said to simplify piping layout and make it possible to join steel or wrought iron pipe without threads and without welding, by a brazing method any competent pipe fitter can use. Flagg-Flow is described as a joint that opens the way to reducing the wall thickness and weight of pipe through threadless fitting. Designed for brazing to standard black steel or wrought iron pipe, the fittings are made in sizes up to and including 2 in. They are said to withstand high rates of vibration and therefore are advantageous on lines subject to vibration, contraction or expansion. Threadless malleable fittings are applicable for 150-lb working steam pressure at 450°F, or 300 lb, non-shock, oil, water or gas lines at 150°F. Such fittings are said to give freedom in piping layout as no wrench clearance is



needed or even jaw space. They can be faced in exactly the position desired and brazed in that position. The silver brazing alloy flows by capillary action to form a seamless, permanently bonded joint. No special skill is required for installation.

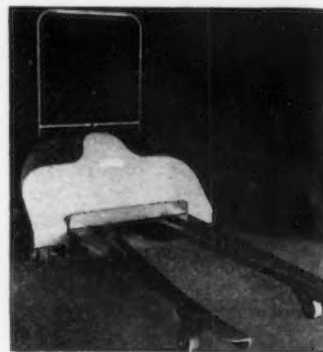
Lift Truck

ASINGLE stroke lift truck designed for use with skid loads up to 2500 lb has been developed by *Lyon-Raymond Corp.*, Greene,

N. Y. Features claimed for this truck include greater underclearance for negotiating ramps, and light weight. Single frame design incorporates the use of heavy gage formed steel plate. Front wheels are equipped with roller bearings, and operating radius is 180°. Other features include push button action engaging the lifting device, safety lock-on handle and hydraulic release check.

Hand Pallet Truck

A HYDRAULIC-OPERATED, hand pallet truck placed on the market by *Sherman Industries*,



Div. of Sallinger-Sherman, Inc., 138 Brookline Ave., Boston 15, has a 2000-lb capacity, is operated by a standard hydraulic jack unit, tested to 10,000 lb static capacity. Two of the four wheels swivel 360° in close quarters permitting easy maneuverability of the truck with the handle locked in vertical position. Wheels are equipped with roller bearings. The truck is designed to handle standard pallets and has a lift of 2½ in. Weight is listed at 175 lb.

LoH Electrodes

A HYDROGEN free, mineral type, extrusion coated electrode said to eliminate underbead cracking is available from *Westinghouse Electric Corp.*, 306 4th Ave., Pittsburgh 30. Ranging in diameters from ¼ to ⅝ in., these electrodes are recommended for use with dc reverse polarity and also for ac. Typical applications include welding high carbon steels, welding high carbon to low alloy steel, welding low alloy steels; welding high sulfur bearing steels not heretofore weldable; welding mild steel structures that are to be vitreous enameled without previous heat treating; and, for welding steel parts of unknown analysis.



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The only way to reduce real costs is to produce more goods per man-hour of labor. No type of machine does this more effectively than a PRESS. Parts which are PRESS produced are invariably lower in cost, size for size, pound for pound, and detail for detail, than parts produced by casting, machining, or other methods.

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tension of PRESS techniques. Clearing has made important contributions in this direction. Many an item formerly manufactured by slower, costlier processes is now created by a Clearing press—often at a single stroke. Large or small, such parts usually improve the product and always show up advantageously on the cost sheets.

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simply can't afford to ignore this important economic law. Adapting your parts for PRESS production, utilizing the extreme precision and great flexibility of Clearing equipment, might be the most profitable step you have ever taken.

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THE WAY TO EFFICIENT MASS PRODUCTION



THE IRON AGE, January 22, 1948—77

• Buick becomes first car producer to offer a torque-converter to car owners . . . This device has many advantages for the driver . . . New type engine mounting also featured in 1948 Buick.



DETROIT—Climaxing an intensive research development extending back more than 3 years Buick introduced its new Dynaflow torque-converter transmission last week, thereby initiating what some observers predict will be the hottest engineering race in the automotive field.

To understand the appeal of the automatic transmission it is necessary to know that these devices reduce 15 physical motions by the driver to only three movements. This is the basic advantage of the device which, in the beginning at least, will undoubtedly cost more than the synchro-mesh transmission.

Buick's infinitely variable transmission for "clutchless driving" will be offered as optional equipment on the Roadmaster series only for 1948 but the company confidently expects to produce "tailor-made" versions of the new transmission for its other models. Some minor changes will have to be made to accommodate powerplants having less horsepower than the Roadmaster models.

In readily understandable terms, the new Buick transmission is simply an oil-driven turbine that is capable of multiplying torque under control of the driver. In this re-

spect it differs from the fluid clutch which is incapable of increasing the torque effort of the engine.

From a mechanical standpoint, Buick's Dynaflow transmission consists of a converter so designed that it multiplies torque under some driving conditions and acts as a simple fluid coupling under other conditions. There are five independent rotating members of the torque-multiplier—the primary pump, secondary pump, turbine, primary stator and secondary stator. To say it another way, there are two pump stages and two stator or reaction stages.

The primary pump is bolted to the flywheel and turns at crankshaft speed at all times. As the pump rotates, oil is thrown into the periphery and thence into a turbine whose blades are in reverse direction to those of the primary pump. The turbine is splined to the input shaft.

The stator elements of the converter serve to redirect the flow of the oil back to the pump and are responsible for the increase in torque. Each stator is mounted on an over-running clutch mechanism which permits free rotation once the car is at speed but holds these members in a fixed position under certain other driving conditions. The two stators are rigidly fixed to the case when torque multiplication is required (that is in starting), but run freely when the converter operates as a fluid coupling.

The secondary pump, on the other hand, is so arranged that it free-wheels and overruns the primary pump when torque multiplication is called for, but becomes fixed to the primary pump and rotates with it when the converter reaches a driving speed which permits efficient use of the fluid coupling.

The new Buick transmission is capable of torque multiplication corresponding to a gear ratio of 2.24 to 2.4 to 1.

ALL free rotating members are made of aluminum castings produced by the plaster mold tech-

nique developed at Antioch, Ohio. Vane thickness is approximately 0.085 in. This process was described in THE IRON AGE, Jan. 15, 1948, p. 74.

The design of the Dynaflow transmission is such that oil is caused to run through the complete cycle without shock which accounts for the unusually smooth operation of the transmission. Gear ratio changes smoothly in response to pressure on the accelerator by the driver. There are no automatic controls or governors and there is no gear shifting in the converter unit.

Buick engineers have explained that under ordinary conditions no oil changes are required, and that most service work can be performed simply by removing the plates on the lower side of the transmission. The oil used is 10 W. The company started a service school several months ago and extensive training has already been given Buick dealers.

Emergency low speeds and reverse are provided for by a unique 2-speed planetary transmission. When the driver elects to use this gear the output shaft runs at reduced speed and a reduction of 1.82 to 1 is available. However, taking into account the torque multiplication as well, the resulting gear reduction is approximately 4.10 to 1.

To operate the car in reverse, the driver moves a lever attached to the steering post into the reverse position. This applies a band hydraulically, initiating a cycle which turns the planetary unit in a counter-clockwise rotation and introduces at the same time a gear reduction of 1.82 to 1.

Oil supply for the new transmission is provided by two pumps, each operating independently. The front pump has greater capacity and is driven by the engine. This pump supplies the necessary volume of oil for starting, operating in low gear and in reverse. The rear and smaller pump operates the direct

Airless Wheelabrator Blast Cleaning

The Way to Stop
Gear Cleaning
HOLDUPS in
Production and Costs

Partial list of Gear Mfrs. using Wheelabrators

Gleason Works
Saginaw Steering Gear Div.
Fairfield Manufacturing Co.
Ross Gear & Tool
Warner Gear Division
Frost Gear & Forge Co.
Brad Foote Gear Works, Inc.
Detroit Gear & Machine Co.

Typical list of Gears being Wheelabrated

Hypoid gears
Helical spur gears
Splines
Spiral ring gears
Herringbone gears
Pinions
Spur cluster gears

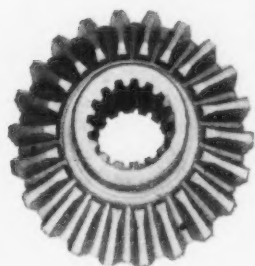


Old fashioned methods give way to low-cost airless Wheelabrator speed cleaning in comparative tests. As applied to gear cleaning the case histories of Wheelabrator performance are replete with evidence of production and cost saving advantages such as the following:

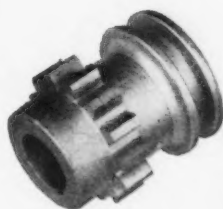
Fairfield Mfg., cleans 800 lb. gear loads in 8 minutes—cleaning perfection has permitted an increase of 20% in machining production and 10% in tool life.

Ottumwa Iron Works has reduced costs 25% in cleaning 175 lb. herringbone gears 8" face, 39" dia.

For faster deliveries and a quick investment return through savings in cleaning and subsequent machining time, power, labor, inspection, floor space, cutting tools, etc., let us show you how others in your field have improved their operations by Wheelabrating.



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PROBLEMS SOLVED IN
THE GEAR INDUSTRY.**



American

WHEELABRATOR & EQUIPMENT CORP.

(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)

510 S. Byrkit St., Mishawaka 3, Indiana

drive clutch and fills the converter when the car is being pushed or towed. It is driven by the rear axle through the output shaft. Both pumps operate when the car is in motion but at speeds greater than 45 mph the rear pump takes over the entire job of the oil supply. A water cooling system is provided to keep the oil temperature in the desired range under severe driving conditions.

DRIVER control of the Dynaflow transmission is through a lever mounted on the steering wheel which lines up the passages that feed oil into the direct drive clutch actuating pistons or the servo pistons operating the reverse or low bands. For parking, the control lever actuates a mechanical locking device consisting of a pawl anchored to the transmission case.

There are five positions on the driver selector lever: "P" for parking; "N" for neutral and starting; "D" for driving range; "L" for emergency low; and "R" for reverse. To prevent accidental shifts, the lever must be lifted in moving from "R" to "P."

Starting can be accomplished only when the engine is in the "N" or "P" position.

After starting, the driver shifts the lever to "D" and depresses the accelerator pedal which provides acceleration up to any desired speed. The left foot operates the brake while the right foot remains on the accelerator pedal. Emergency low is used when driving in slow traffic lines and also offers facility in "rocking" the car to get out of mud, sand or soft snow. The shift from forward to reverse can be made even more quickly than where a conventional clutch and gear box is employed.

From an engineering standpoint the new transmissions are said to provide much higher efficiency than the torque converters used on tanks during the war or present bus designs. Downhill engine braking is provided down to speeds of approximately 35 mph. About 35 lb weight has been added to the car. Gas mileage under city driving conditions will undoubtedly be less than the conventional transmission, but overall efficiency under over-all driving conditions is expected to approach the present synchromesh transmission.

VOLUME production of the new transmission is scheduled to start this week. Some tooling difficulties have been experienced, but these are expected to be cleared by the end of the month.

During 1948 the new transmission will be available only on the 150 hp Roadmaster models, but if public reception reaches Buick's expectations, other Dynaflow transmissions with slight changes in blade curvature and other details will be brought out. Most sources believe the new transmission will cost a minimum of \$200 as optional equipment.

In addition to its new transmission, Buick will introduce a new three-point system of synthetic rubber engine mounts designed to prevent engine vibrations from getting "in tune" with other vibrations resulting from road irregularities. There are two front mounts and a rear mount composed of two pieces of rubber located at the torque ball joint. Buick has also adopted as standard a new piston ring setup, consisting of two compression rings, a "Flex-Fit" oil

control ring and a modified conventional oil ring to provide "quick-seating" characteristics.

Wide rims introduced by Buick in 1941 will be continued but new 7.60-15 tires carrying 24 lb will be used on the Series 50 and 8.20-15 with 22 lb pressure on the Series 70. Both sizes are mounted on 6½ in. rims.

In introducing its Dynaflow transmission, Buick becomes the seventh car producer to offer "shiftless driving" to the public during the last 15 years. In 1933 Reo offered a "Self-shifter." In 1937 Oldsmobile introduced its first automatic transmission which was later succeeded by the present Hydramatic. Just before the war two fluid-coupling type designs were introduced—the Studebaker Turbomatic and Lincoln Liqumatic. Chrysler's Fluid Drive was introduced in 1940 and Hudson first offered its Drive Master in 1941. At the present time, car buyers can select from the Fluid Drive, the Hudson Drive Master, the Oldsmobile and the Cadillac Hydra-Matic and the Buick Dynaflow.

UAW to Ask Wage Hike

••• With the recent announcement by the UAW (CIO) that it will seek a 25¢ hourly cost-of-living wage increase plus three "fringe" demands totaling an additional 5¢, attention was being centered on whether General Motors or Chrysler would be the target for 1948 and the third round of pay increases for auto workers since the war.

The demand of an additional 5¢ per hr for each worker covers hospitalization, health, medical and surgical insurance. In addition, the union is demanding a guaranteed 40 hr weekly wage and three weeks' vacation with pay for all autoworkers with five years' seniority.

The Union policy committee will meet this week, it is reported, to determine whether wage demands on Chrysler Corp. or General Motors will come first. Under the terms of the union contract, wage discussions with GM could start as early as March 1.

Informed sources here believe that the union may make an effort to obtain a union shop where con-

tracts are due to expire. Under the Taft-Hartley Act employees in the plant must approve a union shop provision before it becomes binding on them. However, even if employees vote in favor of a union shop, management has the right to make this an issue for collective bargaining.

There has been no immediate comment from auto producers. If the 25¢ advance is granted, the average hourly wage of Ford workers will be \$1.81. Chrysler workers will average \$1.80 and the GM average rate will become \$1.78.

Closing Bids Jan. 30

Washington

••• An Army subdepot at Salt Lake City, operated during the war by Remington Arms Co., has been offered for sale by WAA. With raw materials readily accessible, WAA says the property could be easily converted to manufacture of builders hardware, glassware and varied products requiring iron, steel, copper, brass, lead, silver, gold or zinc. Closing date for bids is January 30.



1 1633—First brewery in America was built in New York City near what is now Wall Street. Our Founding Fathers fostered this "beverage of moderation" by low taxes on domestic beer.

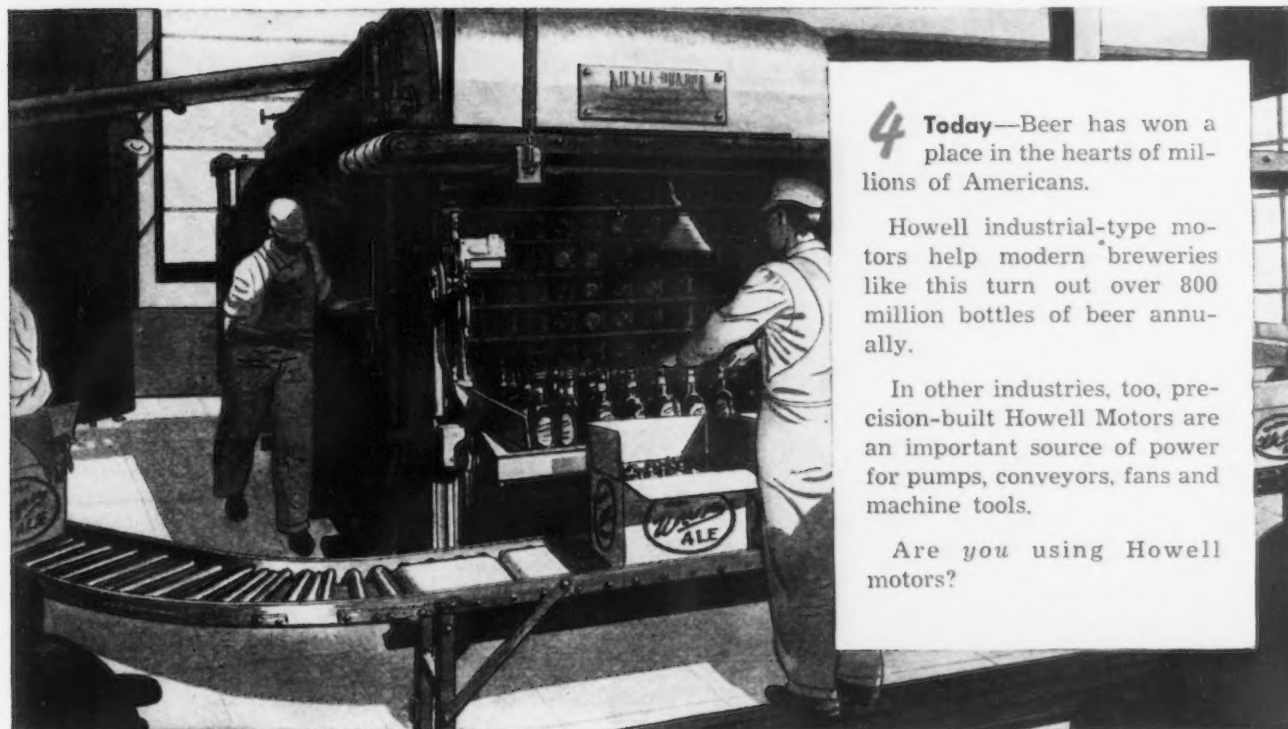


2 1842—Lager beer arrived and for years demand far exceeded supply. Improved methods of bottling, capping and handling that were to make brewing "big business" were still to come.



3 1915—Howell industrial-type "Red Band" motors appeared. The advent of low-cost electric power made modern bottling possible, upped beer production, cut costs. Brewing boomed!

NOW ... BEER BELONGS



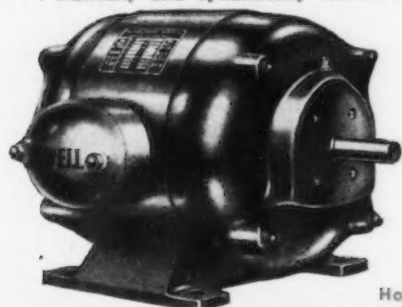
4 Today—Beer has won a place in the hearts of millions of Americans.

Howell industrial-type motors help modern breweries like this turn out over 800 million bottles of beer annually.

In other industries, too, precision-built Howell Motors are an important source of power for pumps, conveyors, fans and machine tools.

Are you using Howell motors?

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.



Howell
Protected and Splash-proof Motors

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

• Nail production cited as example of failure of government controls . . . Administration still asks for regulatory powers . . . Voluntary nail program underway . . . Steel allocation for nails being studied.



WASHINGTON — Administration planners now working up a good case of frustration over the voluntary allocations law and preparing another plan of strategy for selling the Congress on the need for compulsory controls might well consider the case of the lowly nail.

Nail production has run the whole gamut of government panaceas, including OPA controls, WPB allocations, CPA incentives and NHA subsidies. Currently, voluntary cooperation on the part of producers is being tried under the sponsorship of a subcommittee of the Joint Housing Committee, headed by Senator Flanders, R., Vt. The Commerce Dept. is also considering a voluntary program to channel more steel to nail producers by utilizing the machinery of the new anti-inflation act.

With all of this bureaucratic effort there is still a shortage of nails. In fact, preliminary estimates of the Commerce Dept. indicate a production deficit of about 200,000 tons for 1948.

There is perhaps no clearer example of government interference which has failed to provide a solution where demand exceeds supply.

The current problem is a many-sided one in which two factors stand out prominently—one is that current production is below requirements; the other is that there is a great deal of maldistribution, that is, supplies in some areas are reaching consumers through other than regular channels. This results in some users paying two and three times normal market quotations. Generally, the nail situation presents a striking parallel to that existing in flat-rolled steel.

THE program launched by producers as a result of conferences with Senator Flanders recognizes an important fact overlooked by most of the Administration's control advocates, namely, that a permanent solution to any problem involving short supply commodities cannot be achieved by permitting a government bureau to divide the available supply in another manner.

Consequently, the program agreed to by nail producers accentuates production rather than distribution. It is a three-pronged attack involving: an attempt by producers to increase nail production, particularly in housing sizes; closer policing by producers to prevent nails from getting into the hands of gray marketeers; and increased shipments of current output into the worst shortage areas where gray market operations are flourishing. It should be noted that no attempt to allocate supplies is included.

Increased production is the only real solution, for there are no signs of an easing in demand. Quite the reverse is true, as indicated by Commerce Dept. estimates which forecast an increase in demand for the current year of about 20 pct over 1947.

At the beginning of the ill-fated Wyatt housing program, another example of administrative fumbling, the then existent CPA estimated 1946 demand at about 795,000 tons; the 1947 requirements were placed at 835,000 tons. The foreseeable supply at that time was estimated at about 180,000 tons

short of requirements. The subsidy program of \$1 a keg, then placed into effect, failed to produce the needed nails but did substantially reduce the predicted shortage.

PART of the current shortage is due to the fact that nail production did not increase materially during the war years. In addition, during the immediate postwar period when building requirements were expanding rapidly, nail production stood still, partially due to rigid controls of OPA which tended to encourage production of more profitable items. The average monthly tonnage production for 1940-47 follows:

1940	64,000	1944	53,000
1941	65,000	1945	50,000
1942	70,000	1946	53,000
1943	66,000	*1947	67,000

*(est.)

Under the Wyatt subsidy incentive, monthly production recorded a new peak of 81,000 tons in January of last year, hitting a low of 58,000 tons in July following earlier termination of the nail premium payments. However, in view of the difficulties encountered in getting steel rods, producers express doubt that continuation of subsidy payments would have increased 1947 monthly production. This production, as reported by the Commerce Dept., was as follows:

January	81,682	July	57,865
February	72,000	August	63,738
March	77,000	September	64,998
April	78,000	October	64,000
May	71,236	*November	62,000
June	65,438	*December	60,000

*(est.)

ON THE basis of Commerce Dept. estimates, an increase in construction activity from \$12.5 billion in 1947 to more than \$15 billion in 1948 may be expected. The Department estimates that a supply of not less than 772,000 tons of nails will be needed this year for building alone. At the current annual production rate of about 815,000 tons, this would leave approximately 50,000 tons available for all other purposes. However, Com-



"\$5.00 a day for mechanics?

... the man is mad!"

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Today, rising labor and material costs are pushing your "break-even" point to unheard-of percentages. Your future profits—even survival—can well depend on *how you cut production corners.*

That is where Tinnerman SPEED NUTS can help you. No matter what you manufacture, there is a very good possibility that you can begin to cut cost and time corners in assembly operation with SPEED

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THERE'S A SPEED NUT FOR EVERY FASTENING NEED—MORE THAN 4000 SHAPES AND SIZES

THE IRON AGE, January 22, 1948—83

merce estimates that 200,000 tons for all "other" purposes is a conservative figure.

Integrated mills are currently producing as a whole at about two-thirds capacity. Most non-integrated mills say that they are not doing as well.

According to the best available figures, the 12 major integrated steel producers and seven major independent nail producers control 3600 nail-making machines having a monthly rated capacity of 98,000 tons as against the 1947 output of 67,000.

Thus, with the government forecasting a million-ton requirement for 1948, the question facing industry is not more capacity but how may the production rate be stepped up to meet expected demand. All producers, integrated and non-integrated, say they would like to run closer to capacity production, although they claim their profit margin has been greatly reduced by higher operating costs. They cite as their greatest obstacle the difficulty in getting steel.

Further complicating the situation is the fact that although operating below capacity, nail producers are still turning out their product at rates ranging from 17 pct to 47 pct above 1940 production

when the total reached 641,000 tons. The peak year was 1943 when the mills reached a rate of 849,000 tons.

It has been proposed that the housing needs might be relieved by concentrating production for any 90-day period upon 60 standardized types and sizes most commonly used in home construction. At present, nail mills are turning out 125 or more different kinds of nails, some of which are said to be in long supply in most areas. This was given the cold shoulder by nail producers who say that because of technical difficulties this would not be feasible.

HOWEVER, nail manufacturers voluntarily agreed to take all possible steps to bring building type nail machines into fuller production. If more steel rods could be obtained, they said, perhaps such equipment could be put on a three-shift, 5-day week basis.

Senator Flanders contends that this is possible if steel-makers would make a slight switch in allocation of steel in favor of the nail producers. He holds that the quantity involved in raising production from the current 67,000 tons monthly to nearer the rated 98,000 ton capacity is so small as to cause

only a "negligible" impact on other steel consumers.

While Committee investigators turned up widespread gray market activities on the West Coast, along the Gulf Coast, and East of the Alleghenies—the severest shortage areas—the committee feels that the gray market is largely a "house of cards that will not require much effort to push over."

The subcommittee cleared producers of suspicion of complicity in these irregular operations. Senator Flanders told producers that the Committee was convinced that they were not profiting from the gray market. Consequently, the committee applauded industry pledges to check more closely on buyers; cut off those participating in the gray market; and immediately step up shipments into the most serious shortage areas.

While gray market deals undoubtedly do slow up distribution, it is generally agreed that they do not have a major bearing on the overall shortage. The real problems cited above are much deeper since, if the ultimate price to the consumer is disregarded, even gray market nails eventually reach consumers. It all adds up to the fact that, like many other items, production of nails at present is insufficient to meet demand.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



Enamelware Shipments Down in Third Quarter

Washington

• • • Value of porcelain enameled steel plumbing fixture shipments dropped slightly during the third quarter of 1947, but maintained the high level of shipments attained during 1946, according to the Porcelain Enamel Institute.

The steady climb of steel fixture shipments in the four quarters of 1946 and the first 3 quarters of 1947 is shown by the following approximate total dollar values reported for those periods:

	1946	1947
First quarter	\$2,934,000	\$3,441,000
Second quarter	5,280,000	9,617,000
Third quarter	8,573,000	9,001,000
Fourth quarter	9,692,000	

Shipments of cast iron plumbing fixtures also dropped slightly for the third 3-months period of 1947. Third quarter shipments for cast fixtures totalled \$19,156,713, compared with \$19,276,360, reported for the year's second quarter, the institute report stated.

BARIUM FORGINGS

ARE HEAT-TREATED

WITH PRECISION



Shown here are a 5700 lb. prime mover shaft emerging from quench and a typical test report.

Form 1708

Barium Steel & Forge, Inc.
CANTON 1, OHIO

MILL ORDER 10207 CUSTOMER *Federal Trust Co.* METALLURGICAL LABORATORY TEST REPORT

DESCRIPTION OF PART Grade Heat No. Prod. Unit Yield St. Tens. St. Elong. 4 in. 2 in. Red. of Area Hard-ness

8" Ø ARMATURE SHAFT	4340	73911	92000	97000	117000	24.0	54.7		
10" SHAFT	4340 Mod. V31137	16810	92500	98000	126500	24.0	57.0		
			103500	108500	120500	22.5	62.5		

CUSTOMER ORDER NO. *AN 930 (6)* DATE *10-16-47*

HEAT TREATMENT AND REHARDEN
1100 Anne 1175 Quench 1150 Temper
SAME
SAME 1240 H

VENDOR — MILL Grade Heat No. C Mn Si P S Cr Ni Mo W V Other

<i>In Station</i>	4340	73911	.40	.66	.29	.017	.026	.81	1.81	.22				
<i>Wm. L. S. S. Co.</i>	4340 Mod. V31137	16810	.41	.69	.25	.018	.027	.79	1.74	.22				
			.38	.76	.27	.010	.010	.73	1.94	.40				

CHEMICAL ANALYSIS

The most exacting forging technique is futile unless supplemented by equally precise heat treatment. Accurate heat treat control of large and small sections in every grade of alloy, stainless and tool steels is made possible by modern car type furnaces which handle work up to forty feet in length, eight feet in width and 50,000 lbs. weight; quenching tanks with adequate coolant reserves to handle these large masses; and close supervision by a fully staffed metallurgical department.

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• Ship conversion, construction and repair in Seattle limelight . . . Another aluminum producer? . . . MM & SW talk wages . . . Thousands of tons of Japanese steel sheets are going to someone.



S EATTLE—Some concern is being evidenced here over the falling off of employment in ship repair and conversion yards.

The chamber of commerce and the Metals Trade Council are combining their efforts to increase the percentage of conversion work done on government ships in this area. The two groups are casting a jaundiced eye down the Coast to San Francisco which they believe is being overly favored in this respect.

Employment at the local shipyards has fallen to the point where many men are working only ten days or so each month.

Malcolm McLaren, secretary of the Council, believes that it will be necessary to place Seattle on a parity with San Francisco for the conversion of ships before this situation can be remedied. He admits that the reason for most of the conversion jobs being done in San Francisco is the fact that most of the ships are already in that port, and to get them to Seattle would cost many thousands of extra dollars and put the local yards at a disadvantage when bidding.

Todd Shipyards here have recently been awarded contracts to convert the transports General Hodges and General Hase at an estimated \$1 million. The same

company will convert the General Collins and the General Freeman in its San Pedro yards.

Ship repair and conversion are far from dead in this area. The Commercial Ship Repair Co. has recently purchased the Winslow Marine Railway & Shipbuilding Co. on Bainbridge Island in one of the most important transactions of this kind in the area for many years.

Commercial now has on its hands the conversion of the Cossatot, Navy tanker, at a \$429,000 figure. This vessel is destined for the Merchant Marine. This is one instance in which a ship located in the San Francisco port was towed to this area for work.

The Lake Washington Shipyard at Houghton near here has been sold to the Alaska Terminal & Stevedoring Co. for use as a tie-up yard. No construction or repairs are anticipated here.

Ship construction is still an important payroll builder and at the present time there are several small vessels on the ways.

According to H. C. Hanson, naval architect, contracts have been awarded for 12 all-welded steel boats to firms in this area. Weldit Tank & Steel Co. of Bellingham has two oil-tank and deck lighters; three fish barges; and two power barge hulls. Weldcraft of Bellingham will build one single funnel fish packer; Danielson Shipyards of Cahlumet will build one trawler; Manly Shipyards of New Westminster, B. C. will build two tugs; and Sagstade Shipyard of Seattle is building a 16-ft, 100 hp bulldozer tug.

Lake Union Drydock Co. of Seattle is installing special facilities on barges owned by the Alaska Freight Express Corp. to protect cargo from the weather in the Alaskan trade. Closer sorting and segregation of freight with resultant more careful stowing will be possible with this equipment. Star Machinery Co. of this city is designing special hoists for cargo handling which can be moved from one hull to another and will elimi-

nate need for dock cranes and hatch tents during loading or discharging.

SAN FRANCISCO—From rumors floating around, it appears that there may be a fourth producer of primary aluminum in the picture.

While without confirmation, it is believed that the American Smelting & Refining Co. is giving serious consideration to the operation of the long-closed aluminum reduction plant at Riverbank, Calif., which during the war was operated by Alcoa and has a capacity of approximately 48,000 tons of aluminum pig per year. It is known that the three established aluminum producers have been approached by WAA on the possibility of purchasing and operating this unit without success thus far. A power demand of 864 million kw-hours would be necessary to operate this unit at capacity and with the 4 to 4½ mills per kwh rate which would probably apply, it seems improbable that this operation would be economically feasible. Another obstacle to producing aluminum at this plant is the problem of fume control which during the war caused considerable antagonism among neighboring farmers and resulted in lawsuits. However this possibly could be remedied by the installation of a scrubbing unit similar to that put into the Tacoma, Wash. plant by The Permanente Metals Co.

Regardless of the cost, it would appear to be problematical whether such a large block of power would be made available at this time unless some pressure were exerted by the Federal government to bring about operation at this plant.

SALT LAKE CITY—Wage demands of the International Union of Mine, Mill & Smelter Workers will be decided upon at a series of conferences starting this week and continuing until mid-February, when the wage policy committee will be elected at a general meeting in Salt Lake City.



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 old building purchased in 1942 (our
 year), was doubled in size in 1944.
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 our space . . . and is entirely devoted

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to our "SUPERDRAW" products . . . It is
 proven logical that the same technicians
 who supply the correct lubricants for
 drawing metals also provide the material
 for making it chemically clean afterward.

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Most of the contracts expire June 30 and negotiations are expected to start a couple of months in advance of that date.

One potential threat to the non-ferrous metals production level, which is creeping slowly upward, is the issue of incentive pay. Virtually all underground mines are sweetening the paychecks with bonus pay for extra work, and elimination of this incentive would certainly cause production to slump. The union, never friendly to the system, wants to set the incentive or bonus pay by negotiations. To this the operators have always replied with a firm "no" and they are not likely to change their minds this year. The disagreement has resulted in the abandonment of the system at one Utah mine, and operators are fearful that the trouble will spread as contracts are reopened.

A big question, which could affect this and other issues, is just what position the international union will occupy in the negotiations this year. Three locals in Utah and Nevada have already withdrawn because of the internal fight over communistic influences and others are expected to follow suit in the near future.

The home folks are urging Utah's congressional delegation to oppose the contemplated transfer of the U. S. Bureau of Mines alloy section from Salt Lake City. Only a dozen or so positions are involved.

O. C. Ralston, chief of the bureau's metallurgical division, patiently explains that the work of the section is of no particular interest to this area. It is currently engaged in research on titanium, a metal with about twice the weight and four times the strength of magnesium. The research is of greatest interest to the army and navy and most of the ore is mined in New York State. While the metal may eventually be extracted from copper tailings in this area, that development has not yet advanced beyond the "talk" stage, Mr. Ralston said.

LOS ANGELES — Somebody, some place, is going to get 20,000 metric tons of hot rolled steel sheets in gages of from 18 to 24, and 5000 metric tons of galvanized sheets of an unspecified gage at an unspecified price, according to officials of Yaras & Co.

This import and export company reports that they have closed a deal with the Boeki Cho of Japan for those quantities of steel sheets. This transaction was announced some time ago as involving 40,000 metric tons of steel and the difference is said to represent the material now held on option by Yaras & Co. Delivery of this steel to an unnamed destination is reported to begin in early April and all quantities will have been shipped by December of this year, according to the company.

The transaction involves shipment by Yaras & Co. to Boeki Cho of 30,000 long tons of coking coal from Canada and the first 8000 tons of this material left Seattle January 5.

According to the best information available, this transaction is being financed through a Los Angeles bank and involves approximately \$7 million.

Repeated requests for details on price and delivery points for this material have met with no response although the transaction is reportedly carrying the approval of the Supreme Command Allied Powers which is a governmental agency with complete control of imports and exports to the Japanese nation. Steel hungry westerners are concerned over the possibility of this scrap material going to South America, or at best, being offered on the West Coast at premium prices.

Incidentally, similar material is being offered locally for approximately \$250 per ton f.o.b. Pittsburgh. However, so far as can be learned, there have been no takers.

With modest ceremony, the new 50-ton electric furnace of Bethlehem-Pacific Coast Steel Corp. was put into production operation last Friday, although it had been operating experimentally for more than a week.

This operation marks an important step in the \$14 million expansion program designed to double the capacity of the local plant which includes a new 32-inch blooming mill, and the West Coast's first high speed combination rod and bar mill with a 21-in. roll stand. A new wire mill producing wire from a minimum size of 20 gage bright through a range of heavier sizes used by West Coast manufacturers is also a part of this program. The employment roll of 1200

men now at the plant will be increased to about 1500 in mid-summer when the major expansions have been completed.

The new electric furnace, which is the largest on the West Coast, produces a heat in approximately 4 hr and uses approximately 5 million kw-hr of electricity per month, which is enough to supply the needs of a modest sized city.

The first round in the battle over the sale of the Eagle Mountain Iron Chief ore deposits by E. T. Foley, Pasadena capitalist, to the Kaiser Co., Inc., is being watched closely as it got under way last week in Superior Court here. Harlan H. Bradt, Los Angeles mining engineer, is contesting the sale on the grounds that he was not consulted in this transaction and the price at which Mr. Foley disposed of the property was too low. Observers expect this trial to drag along for several weeks.

RECENT approval for the use of extruded aluminum pipe in some heretofore restricted places by the Western Plumbing Officials Assn. is expected to give considerable impetus to the sale of this material locally.

The bulk of material used in this area is supplied from the Phoenix, Ariz., plant of Reynolds Metal Co., the Vernon plant of Alcoa and from the Los Angeles plant of the Harvey Machine Co.

Produced in practically all sizes of standard iron pipe, the extruded aluminum tubing is being used in many places where galvanized iron was favored, such as for hand railing, guard railing, playground equipment, parking meter standards and construction scaffolding.

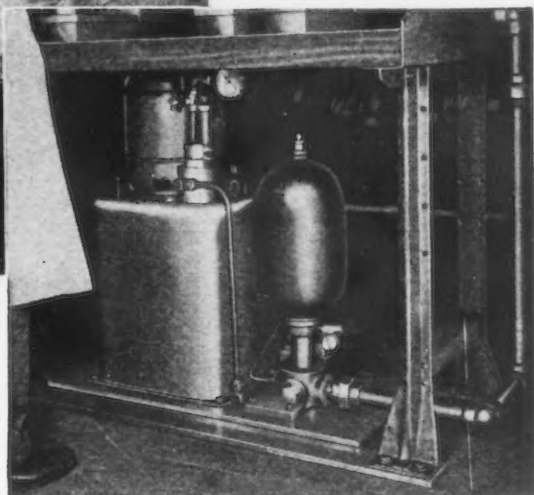
WAA is continuing its flourishing real estate business in this area with one of its most recent sales being that of Unit No. 3 of the surplus Douglas Aircraft Co., Inc. plant at Long Beach to the County of Los Angeles for \$162,500, of which only \$75,595 will be paid in cash and the remainder granted as an allowance for public health and educational purposes to local governments.

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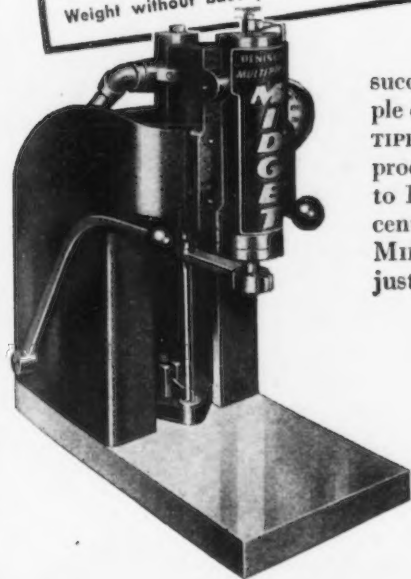


⏏ All four of these Multi-press Midgets are being operated by ONE pumping unit, shown below. Up to 12 Midgets may be used with one such unit—the ultimate in low initial and operation cost! ⏏



SPECIFICATIONS (basic unit)

Capacity (ram effort).....	1 ton
Stroke.....	.6"
Ram speed adjustable up to 400 ipm down—600 ipm up	
Daylight.....	10" or 14"
Throat depth.....	5"
Base Plate tooling area (optional). 10"x10" (standard)	
Dimensions....	.24 3/4" high x 17" deep x 18 1/4" wide
Weight without base plate.....	130 lbs.



When your manufacturing calls for successive operations on a part, multiple or "gang" installations of the MULTIPRESS MIDGET will give you increased production—with low initial cost! Up to 12 units may be used with a single, centralized power source, with each MIDGET having individual pressure adjustments from 200 to 2000 lbs.

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Write today for Bulletin M-15—it's filled with facts on this new addition to the MULTIPRESS line.

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PERSONALS

• • •

• **R. D. Wood** has been elected chairman of the board of Mississippi Valley Structural Steel Co., Decatur, Ill., succeeding **W. M. Wood**, who has retired. **J. B. Butler** has succeeded **R. D. Wood** as president, and **A. H. Bennett** has been elected treasurer. **E. T. Blix** has been named vice-president and manager of the Melrose Park plant, and **R. R. Bramhall** has been appointed manager of the St. Louis plant. **F. C. Knorr** has been elected secretary of the company, succeeding **Harvey R. Cosley**, retired.

• **R. W. Davison** has been appointed to the position of manager sales, hot rolled products division, Sheffield Steel Corp., Kansas City. Mr. Davison has been with Sheffield 7 years. In 1944 he joined the sales force as Kansas City representative, and has held that post until his present appointment.

• **Joseph J. Hite** has been promoted to the post of assistant chief engineer of the American Hoist & Derrick Co., St. Paul. Mr. Hite, who started with American Hoist in 1936, formerly held the position of development engineer and more recently of office engineer.

• **Edward G. Lickteig** has been appointed master mechanic of Kaiser - Frazer Detroit Engine Div., succeeding **N. J. Blake**, who has returned to the Kaiser-Frazer plant at Willow Run, Mich., on special assignment.

• **Ernest G. Jones** has been elected director and vice-president of Skagit Steel & Iron Works at Sedro-Woolley, Wash. Mr. Jones has been in charge of production at Skagit Steel since 1946. His election as a company executive follows creation of a new vice-presidency for the works manager, the position he now fills.

• **Albert R. Hutchings** has been appointed executive engineer in charge of engineering and manufacturing for the Carlyle Johnson Machine Co., Manchester, Conn., succeeding **A. R. Coe**, vice-president, who has retired. Mr. Hutchings was formerly a staff member of the Kenneth A. McIntyre Associates. Previously he had been production manager for **B. F. Perkins & Son, Inc.**, and works manager for the Compo Shoe Machinery Corp.

• **H. M. Ridlon** has been appointed assistant director of commercial research, U. S. Steel Corp. of Delaware, Pittsburgh. Mr. Ridlon first joined the American Steel & Wire Co., U. S. Steel subsidiary, as a technical apprentice at their electrical cable works in Worcester, Mass. In 1936 he was transferred to the New York sales office and went to the Cleveland office of the company in 1941 as assistant to superintendent of warehouses. In 1942 Mr. Ridlon was made market analyst and in 1947 became assistant director of commercial research of the Wire Co., the position he held at the time of his present appointment.

• **K. R. Beardslee**, formerly vice-president in charge of sales at Carboly Co., Inc., Detroit, has been named vice-president and marketing manager. In this capacity he will be responsible for all activities affecting the marketing of Carboly products. Sales for the company will be directed by **J. E. Welte**, sales manager, and merchandising activities will be directed by **E. C. Howell**, who has been appointed merchandising manager. Mr. Howell was formerly advertising manager.

K. R. BEARDSLEE, vice-president and marketing manager, Carboly Co., Inc.



• **George F. Karch**, vice-president of the Cleveland Trust Co., has been elected a director of the Reliance Electric & Engineering Co., Cleveland.

• **H. H. Benninger**, formerly of Chrysler Corp., has become associated with Peninsular Steel Co., Detroit. He will handle engineering contacts out of the Detroit office for Peninsular.

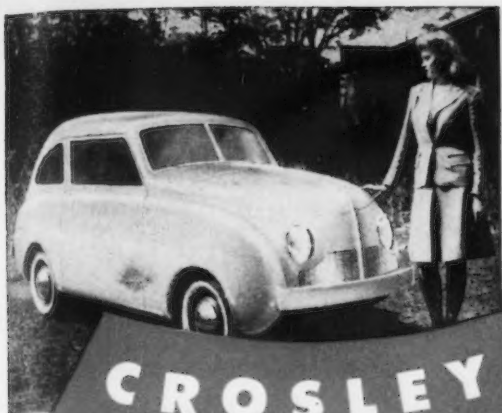
• **E. S. O'Connor** has retired as superintendent of Geneva Steel Co.'s Columbia mine, Columbia, Utah. **F. V. Hicks**, superintendent of Geneva's coal mine in Horse Canyon, Utah, has been appointed general superintendent of mines.

• **Albert E. Brodigan** has been appointed regional representative in the Caribbean area for the Borg-Warner International Corp. Mr. Brodigan has until recently been serving as product manager in both the Detroit and Chicago offices of Borg-Warner International. He will establish his headquarters in Mexico City, where he was located prior to joining the organization.

• **Donald M. Morrison** has become associated with the American Fire Clay & Products Co., Cleveland, in the capacity of sales engineer. He was formerly with the South Works and Gary Works of Carnegie-Illinois Steel Corp. as turn foreman in the blast furnace department.

• **Robert W. Russell** has joined American Cladmetals Co., Pittsburgh. Mr. Russell will carry out the installation program at the company's Carnegie, Pa., plant. Since 1942, he was with Jessop Steel Co. in maintenance and operating positions.

• **Edward L. Mack**, assistant manager, machine tool division, Strong, Carlisle & Hammond Co., Cleveland, has been named manager of the machine tool division, succeeding **George J. Zimmerman**. Mr. Zimmerman, president of the company since 1940, is also retiring as president. Mr. Zimmerman has been associated with the company 46 years. **Harry H. Smith** has retired as manager of the Mac-it division of Strong, Carlisle & Hammond. **Stanton C. Gunnett**, assistant division manager, succeeds Mr. Smith as manager.



CROSLEY ENGINE BLOCKS BRAZED in LINDBERG FURNACE

Over 120 separate parts brazed into a single unit in 1 operation

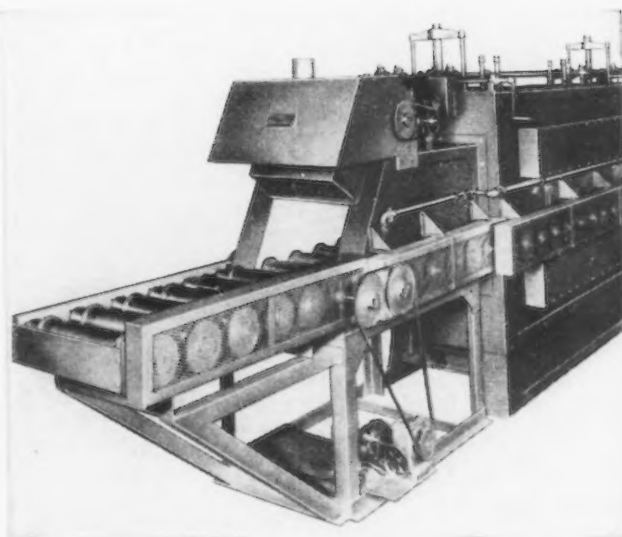
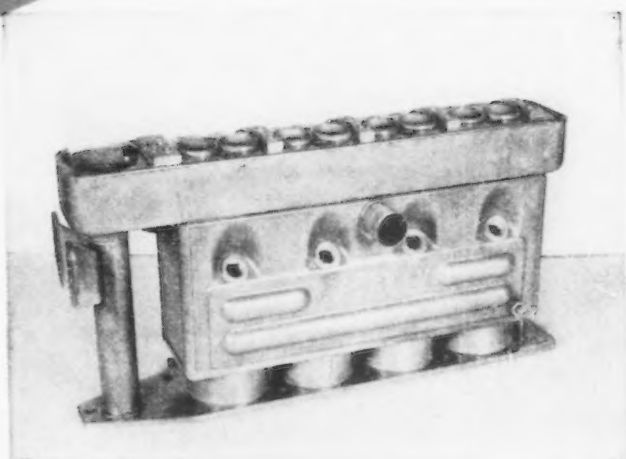
The brazed, all sheet-steel engine block used in the new Crosley car is outstanding among recent engineering developments.

In a single brazing operation, light walled alloy steel tubes and deep drawn steel stampings—over 120 in all—are brazed together in a Lindberg Roller Hearth Brazing furnace to form the Crosley engine block weighing only 14.8 pounds.

Completed engine block assemblies—4 to a tray, are automatically charged into the continuous Roller Hearth Furnace. The work, which at all times is protected by the Lindberg Hyen atmosphere against scaling or decarburization, first enters a preheating zone—then the brazing chamber, where the actual brazing takes place at 2060° F. From the brazing chamber, the blocks go to a slow-cooling zone which reduces the temperature to about 1500° F.

In the next zone, cooled Hyen Hydrying atmosphere is forced over and through the block by means of fans. This atmosphere quenches the cylinders and valve seats to obtain necessary hardness. Thus the furnace not only brazes but also hardens. The block is finally cooled to about 200° F. in the Hyen atmosphere to prevent scaling. This process of assembling and hardening an internal combustion engine was invented and is being patented by Powel Crosley Jr.—and the Lindberg Engineers worked out a particular furnace, which permits quantity production.

Perhaps too, some of the problems of producing your product can be more efficiently solved by employing brazing methods. Lindberg Engineers will be glad to discuss various possible applications of brazing to your line. Write today for Bulletin 210 and a reprint of an article describing how the Crosley automobile engine block is made. LINDBERG ENGINEERING COMPANY, 2452 W. Hubbard Street, Chicago 12, Illinois.



LINDBERG FURNACES

SUPER-CYCLONE • CYCLONE • HYDRIZING • BRAZING

THE IRON AGE, January 22, 1948—91

• **Emerson E. Case**, vice-president and general manager of the Robeson Cutlery Co., Inc., Perry, N. Y., has been elected president of the company, succeeding **Saul Frankel**, who has been named to the new position of chairman of the board. **Milton M. Zelter**, sales manager, has been elected vice-president in charge of sales.

• **Harry O. Bercher** has been appointed director of purchasing and traffic, International Harvester Co., Chicago, to assume the duties of **John Morrow, Jr.**, vice-president of purchasing and traffic, who has retired after more than 45 years with the company. Mr. Bercher, who will also continue as general manager of the steel division, joined the company in 1928 at the iron ore mines at Hibbing, Minn., which were then operated by International Harvester. He served in various positions in the company's general office in Chicago, at the coal mines at Benham, Ky., and at Wisconsin Steel Works.

• **E. C. Quinn** has been named general sales manager of the Dodge Div. of Chrysler Corp., Detroit, succeeding **F. H. Akers**, retired. Mr. Quinn began his automotive career in 1919 with Studebaker. In 1928 he was engaged in automotive retail selling and became associated with Chrysler in 1934 as a special service representative in the DeSoto Div. He was named assistant sales manager of Dodge in 1944.

• **Joseph H. Gillies**, who has been vice-president in charge of radio production since 1942, has been appointed vice-president in charge of radio division operations of Philco Corp., Philadelphia.

• **Robert E. Carbauh** has been named sales manager of a new department for the development and promotion of fire control equipment by Titeflex, Inc., Newark, N. J. Prior to joining the Titeflex organization, he was manager of the aircraft division for Wilcolator Co.

• **H. L. Voight**, product engineer for Geuder, Paeschke & Frey Co., Milwaukee, has been promoted to development engineer.



JOHN E. MARTIN, president, Firestone Steel Products Co.

• **John E. Martin**, formerly vice-president and director of American Type Founders, Inc., has been appointed president of the Firestone Steel Products Co., Akron, Ohio. During the war, Mr. Martin was deputy chief of the artillery division of the Ordnance Dept. Prior to this wartime assignment, he was general manager of the Link Belt Ordnance Co., Chicago, and was associated with the Link Belt organization for 18 years.

• **J. E. Hansen**, director of technical service and assistant secretary, Ferro Enamel Corp., Cleveland, has been transferred to Los Angeles, where he will take charge of Ferro's California manufacturing operations. Mr. Hansen joined Ferro Enamel Corp. in 1926 as a research engineer, was advanced to assistant service director in 1932 and to service director in 1935.

• **T. W. MacLean**, formerly with the Lava Crucible Co. of Pittsburgh, has been appointed sales representative of Western Metal Co. He will cover Indiana, Kentucky and southern Illinois, with headquarters at Chicago.

• **L. C. LeBron** has been named assistant manager of the explosives department's contractors division of Hercules Powder Co., Wilmington, Del. He joined Hercules in 1927.

• **Jack R. Lakin** has been appointed general sales manager of the drop forge division of Willys-Overland Motors, Toledo. He has been with Willys-Overland since 1942.

• **John P. Stevens, Jr.**, president of J. P. Stevens & Co., Inc., since 1942, has been elected a director of American Brake Shoe Co., New York.

• **Robert E. Lewis** has been appointed assistant to the Youngstown district manager of the Youngstown Sheet & Tube Co., succeeding **J. H. Krehl**, who has retired after nearly 46 years of service. Mr. Lewis joined Brier Hill Steel Co. in 1917 as assistant superintendent of the electrical department and 3 years later became superintendent. When Brier Hill was purchased by Youngstown Sheet & Tube in 1923, he was made superintendent of the electrical department for the Youngstown district. In 1937 he was appointed superintendent of maintenance for the Youngstown district, a position he held until his recent promotion.

• **John R. Thompson** has been promoted to the position of vice-president in charge of sales, the Forker Corp., Cleveland, and **Charles E. Payne** has been named assistant treasurer of the company.

• **A. A. Appleford** has been appointed secretary of the McCord Corp., Detroit. He will continue his duties as director of personnel, the post he had held since 1943.

• **Robert Ross**, formerly with the public relations department of the Studebaker Corp., has joined Campbell-Ewald Co., Detroit. He replaces **Ralph Roessler**, resigned.

• **Cliff Knoble**, at one time advertising manager for Chrysler Corp., has been appointed director of advertising for the Tucker Corp., Chicago.

• **Kenneth C. Plasterer** has been appointed head of the newly-created quality control department of the Lincoln-Mercury Div. of the Ford Motor Co., Dearborn, Mich. He was connected with the Oldsmobile Div. of GM for 20 years.

PERSONALS

• **E. W. Whitman**, who for the past 2 years has been assistant superintendent of the Morris Mine in Ishpeming, Mich., has been promoted to superintendent of that operation of Inland Steel Co., Chicago. Mr. Whitman has been with Inland since 1942 when he joined the engineering department. **John H. Strome** has been promoted to the position of safety director for the iron ore and limestone operations of Inland. In this capacity he will supervise safety work of the Morris and Greenwood Mines, the Sherwood Mine, the Bristol Mine and the Armour No. 1 Mine, and also of the plant and quarry of the Inland Lime & Stone Co. at Manistique, Mich. **W. T. McCormick**, whose assistant Mr. Strome has been for the past 2 years, is giving up the title of safety director for these operations in order to devote the majority of his time to his duties as supervisor of occupational hygiene for Inland with his headquarters at Indiana Harbor, Ind.

• **Howard S. Nelson** has been made general manager of Daystrom Laminates, Inc., Daystrom, N. C. Before going to the Daystrom company he operated his own business, the Rockwool Mfg. Co. at Birmingham, which he established in 1945.

• **Clarence M. Strong** has been appointed director of purchases of F. L. Jacobs Co., Detroit. He comes to the Jacobs company from Plymouth Steel Co., where he was general manager. Prior to this, he was with Ford Motor Co. for 28 years in various purchasing activities.

• **W. W. Harts, Jr.**, treasurer of the McCord Corp., Detroit, has been made a vice-president of the company as well as treasurer.

• **Lloyd Harrison** is the new production manager of the Detroit Engine Div. of the Kaiser-Frazer Corp. A former Plymouth executive, Mr. Harrison joined K-F in 1946.

• **R. C. Franklin** has been added to the board of directors of the Jackson Drop Forge Co., Jackson, Mich.

• **J. P. Stewart** has been appointed manager of the newly-combined commercial and marine sales divisions of the De Laval Steam Turbine Co., Trenton, N. J. He succeeds **H. V. Petersen**, who has retired after 34 years' service. **H. G. Bauer**, manager of the marine division, has been appointed executive engineer of the company. **J. W. Hertzler**, manager of worm gear sales since 1924, has retired and is succeeded by **W. A. Reynolds**, who becomes manager of the combined IMO rotary pump and worm gear divisions. **C. A. Jurgensen** has been appointed acting works manager.

• **H. C. Peinert** has been promoted to production manager of the high explosives section of the E. I. du Pont de Nemours & Co.'s explosives department, Wilmington, W. D. **Garwood**, production superintendent at the Repauno plant, Gibbstown, N. J., has been named production manager of the special products and black powder section, succeeding Mr. Peinert.

• **Jules Muller** has been appointed director of engineering of the E. W. Bliss Co., Detroit. He will be responsible for the coordination of engineering between the various product divisions. Prior to his appointment, Mr. Muller supervised welding design and manufacture for Bliss machinery. He joined the company in 1945.

JULES MULLER, director of engineering, E. W. Bliss Co.



• **W. H. S. Bateman**, Philadelphia district sales representative, Champion Rivet Co., Cleveland, has retired after more than 50 years in the iron and steel industry. Mr. Bateman became associated with Lukens Iron & Steel Co., now Lukens Steel Co., in 1893. Gradually he took on additional lines of products to sell, including that of Champion Rivet Co. **Raymond B. Johnson**, who has been associated with Mr. Bateman in business for the past 25 years, will now become exclusive Philadelphia district sales manager.

• **Thomas C. Bradford** has been appointed to the position of field technical engineer by the Anderson Oil Co. of Portland, Conn. He has represented the Anderson Oil Co. in the New England area since 1938.

• **Byron Thompson**, president of Byron Thompson & Co., Jacksonville, Fla., has been appointed distributor for X-ray apparatus manufactured by North American Philips Co., Inc., New York. Mr. Thompson's territory includes the entire state of Florida.

• **Davis E. Postle**, former official of the Civil Aeronautics Board, has been appointed domestic sales manager for the helicopter division of the Bell Aircraft Corp., Buffalo. **Louis S. Kimball**, formerly vice-president in charge of operations of the Colonial Radio Corp., has been appointed sales manager for Bell's new "Prime Mover."

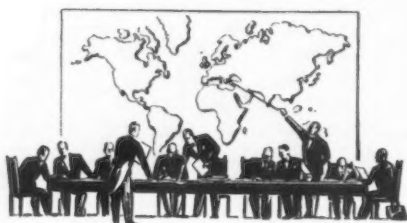
• **E. T. Adams** has been named director of purchases of Kerotest Mfg. Co., Pittsburgh. Mr. Adams has been foreign representative for Kerotest and for 12 years had been purchasing agent of the Sinclair Oil Co. in Mexico. Prior to that time he was in the material department of the Standard Oil Co. of Venezuela.

• **R. E. Klare**, formerly manager of the Federal-Mogul Corp.'s plant at St. Johns, Mich., has been named manager of operations at the Greenville, Mich., plant. **Elmer Pett**, former works manager at Greenville, succeeds Mr. Klare at St. Johns.

(CONTINUED ON PAGE 104)

European Letter . . .

• Britain must seek system which combines individual freedom with a planned economy, democracy with social justice . . . Reconciliation of authority and liberty wanted.



LONDON—Mr. Attlee was more effective in his recent party broadcast than in any of his previous radio speeches since he became Prime Minister. What hit the headlines in the speech was his criticism—surprisingly harsh for him—of the Communists. But there was another aspect of the speech—indeed, its main thesis—which has not received the attention it deserves. This was partly due, no doubt, to the fact that its subject was the well-worn one of freedom and order in the democratic society and that much of what the Prime Minister had to say was the accepted currency of almost all schools of thought in this country.

No one nowadays is startled to be told that, while Russia bases its economy on order with no freedom, and America on freedom with no order (a false picture of America, this, but one that Americans themselves love to paint), Britain must seek a middle way, “a system of a new and challenging kind, which combines individual freedom with a planned economy, democracy with social justice.” There is, indeed, a very large measure of agreement on the desirability of a middle course for Britain.

There are very few who would deny the need for a considerable measure of intervention by the state to insure the stability of the national economy, to secure a stand-

ard of individual welfare and to regulate the external relations of the economy. Many would go further than this; but nearly all would go as far. And on the other side, equally few would push their advocacy of the planned economy to the lengths of turning it into a police state.

UNDERNEATH this widespread agreement, however, and largely concealed by it, there is still a most important conflict of principle. Granted unanimous agreement that what is needed is a reconciliation of authority and liberty, it is still possible to differ diametrically on the nature of the reconciliation to be aimed at.

One conception is that, over the whole economy, in every form of activity, there should be an attempt to inject some element of order and to preserve some freedom of choice. No form of economic activity, anywhere in the economy, should be run on *laissez faire* pure and simple; no businessman should be allowed to operate without some form of control upon his actions; and conversely, the intervening power of the state should never be pressed so hard that it seriously discommodates the organized interests of those who are concerned.

The other conception is that there should be a demarcation of spheres and that, without banning liberty from the one or authority from the other, there should nevertheless be only one dominant principle in each. Where the decision

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is reached to run, say, education on a non-economic basis (that is, without making it cover its costs) social considerations should be given a clear paramountcy over economic; but where another form of activity is to be left to the individual management of private incomes, these motives should be constrained by as little interference as possible. The second conception is of a society that recognizes the difference between red and white; the first is of a society that is pink all over.

There ought to be no room for doubt which is the more appealing conception. The disadvantages of

a society which seeks to control virtually all activities, while taking the responsibility of initiative in none, can be seen today on every hand. The difficulty about any such conception is that freedom and order, however much it may be desired to reconcile them, are in fact conflicting principles. Each provides its own kind of incentive. Each, within its own limits, will work.

It is possible to run an economy on the motives of a free system, on the hope for gain and the fear of loss. It is possible to run parts of an economy, and it may be possible to run a whole economy (though the Russians, the only people to make the experiment, have abandoned it) on the principle of “from each according to his means, to each according to his needs.” But if the two sorts of motive power are introduced into the same problem at the same time, they will merely frustrate and oppose each other, as they are frustrating and opposing each other all over the economy today.

NEVERTHELESS, in spite of all this evidence of the dangers of a dilute and frustrate mixture of authority and liberty, this seemed to be the conception that Mr. Attlee favored. He went out of his way to mock at Mr. Churchill's admittedly sketchy outline of a discriminating system.

The Conservatives have reached the point of conceding the need for a minimum standard of life, but above that there is to be a scramble for the surplus.

No doubt many people would want to put far more into the “socialized sector” than Mr. Churchill would accept. But surely, as a basic idea, the concept of a clear distinction between a socialized sector and one open to healthy individual enterprise (the polite version of “a scramble for the surplus”) is a far more attractive one than the alternative of a dead level of frustrated equality.

Mr. Attlee made much of the necessity for political freedom. But as soon as it becomes difficult for a man who holds unpopular views to earn his living, political freedom is endangered; and the more plar

ning there is, the more will non-conformity be penalized. Moreover, the planning and controlling resources of the state are strictly limited, and if they are spread thin, the planning and the controlling will be slow, stupid and ineffective. Of that also there are examples in everybody's daily experience. Those who wish to see a success made of the planned economy ought to be the most anxious to see its ambit reduced to a few essential functions, where planning can be intensive and intelligent.

STATED in abstract terms, this may seem to be a remote issue. But it is really at the heart of the practical politics of the moment—or if not of the moment (for the pressure of external events leaves little room for any deliberate policy), then of the immediate future. It will be at the center of the stage just as soon as decontrol becomes a practical policy. The Socialists tease the Tories at present by asking them to name the controls they would abolish now. But the question can be thrown back with some justice. Are the Socialists really sincere when they say they hope eventually to dismantle part of the wartime structure of control? They do not give that impression. When one of their Ministers restores free trading in any corner of the economy, as Mr. Strachey did recently, he is attacked, on principle, by his own party.

The attitude of far too many Socialist MPs to the businessman is to "find out what he is doing, and tell him not to." The Socialist movement is not at present prepared to take over the responsibility and the initiative for more than a corner of the economy. It is not prepared to provide an alternative motive power in the great mass of economic activities to that provided by private enterprise. Does it realize just how much damage it will do if, over four-fifths of the national economy, it consistently applies the brake to the only motive power there is?

IT IS wrong, nevertheless, to criticize the Labor Party only because it does not see enough value in economic freedom. It can also be criticized because of the timidity of its ideas about the part that economic authority can play. A member of the wartime Coalition Cabinet once remarked in public

that if he was asked whether Britain required more freedom or more order in its economic affairs he would reply that it needed a great deal more of both. That is the right approach.

There is a great scope for much more courageous and forthright planning than there is today. The great nationalization schemes have no justification at all unless they result in some farsighted policy being followed that was not possible under conditions of private enterprise and the commercial matching of costs and revenues. Where the state can really make a difference by intervening, it will receive plenty of support from public opinion for going ahead with courage and determination. But where it cannot supply the initiative and take the responsibility, the task of the next few years should be to cut down its interventions to the irreducible minimum.

The British people do not yet realize how fast they will have to run in the next few decades merely to keep their place among the nations of the earth. Never was there a greater need to preach the doctrine of liberating motive powers and taking the brakes off all forms of economic activity. There is no single motive power, but sev-

eral, each appropriate in its own sphere.

Let the social motive be exploited to the full wherever it can operate to advantage. And where the only conceivable motive powers are those of individual enterprise, let them also be encouraged. It is by this means, and not by the rancorous jealousy of dead-levelism, that it will be possible to achieve "a new conception of society, with a dynamic policy in accord with the needs of a new situation."

Yoder Co. Creates New Forming-Roll Capacity

Cleveland

• • • Creation of a new department to meet an anticipated 50 per cent increase in forming-roll production has been announced by John Lucas, president, The Yoder Co., Cleveland.

The new department will have its own engineering staff, facilities for producing rolls, as well as equipment upon which they may be tested. Present facilities for doing this work will remain intact.

The new department is a part of Yoder's expansion program for which orders have been placed for \$175,000 worth of machine tools to replace worn and obsolete machines.

• • •

GM IN GERMANY: *Shown being lowered into position on the GM assembly line at Ruesselheim, Germany, is a 4-cylinder motor which will eventually become the power-plant of an Olympia. During 1948 it is hoped to double the current production rate of about 500 cars per month. Export price, as estimated by the Joint Export Import Agency, will be approximately \$1000, with major exports aimed at Belgium, France and Switzerland.*

• • •



Industrial News Summary...

- **Steel Can't Control Gray Markets**
- **Highjacking of Steel Significant**
- **Scrap Buyers Again Hold the Line**

NO one in the country is more anxious to see the elimination of the small but strong and active gray market than the steel producer. But he has no more chance of controlling this situation than he has of stopping the occasional highjacking of steel shipments on the highways. As long as steel supplies run far below total steel demand there will be a gray market—no matter what the Government or the steel industry does.

Congressional admonitions that the steel industry must get rid of the gray market indicate a woeful lack of simple facts on the number of steel industry customers. A conservative estimate shows at least 60,000 individual customers on steel mill books. This naturally includes duplications—few customers buy from only one source if they can help it.

This estimate includes only direct mill sales and not customers on steel warehouse order books. Warehouse customers are estimated at 1½ million, which also includes duplications because customers will order from as many places as possible in an attempt to obtain supplies.

Checking now going on by steel producers to keep their steel out of gray market channels is not organized like a vice crusade. Neither steel companies nor their customers believe that this country is ready for a return of the tactics in vogue while the Eighteenth Amendment was the law of the land. There is no law at the present time which prevents a steel customer from selling his steel for any price he dreams up.

The current gray market which is an offshot of a steel black market during the OPA days, only greatly expanded, is kept alive by customers' actions, not by those of the steel producer. Under present conditions some steel users, obtaining more material than they find they actually need, are afraid to ask the steel producer for a reduction in their quota. The customer feels that if he does this it will adversely affect future deliveries at a time when a real emergency may exist.

Steel consumers cannot afford to advertise excess stocks. This makes room for the intermediary—the steel broker. Much of the steel offered to steel brokers is unsolicited, but some brokers canvass the country from one end to the other for prospective clients.

THE fact that the highjacker has entered the picture more aggressively within the past several months is symbolic of the place excess steel now takes in the national picture. A recent small tonnage of steel—22 tons—stolen by highjackers in the Chicago district, and which the FBI is still tracing, is an example of several cases which have occurred on the highways during the past year.

Cases like this get more attention than their rela-

tive importance to total steel shipments. Almost any story on the gray market gives a prominence to this type of activity which leads the uninformed to the belief that gray market steel is anything but a small tonnage.

Steel sales managers report new business as tight as ever. Customers are still in the "anxious seat" over forthcoming voluntary steel allocations. Their questions cannot be answered by steel officials because it will take some time to set up the necessary machinery at Washington.

One thing seems certain—many customers are going to receive less steel than they are getting now after the so-called essential users, such as railroad car builders, the petroleum industry and the farm implement makers, have their inning at Washington. It now begins to look as if the steel customers who yelled the loudest many months ago for controls are going to find that they have got the voluntary controls but they haven't got the steel.

Except in the Philadelphia district, where the price of No. 1 heavy melting steel is up an average of \$4 a ton this week, steel mill buyers appear to have won the third round in the scrap price battle. Substantial purchases of openhearth grades have been made at the so-called anti-inflation formula price. Shipments are being made against these new orders. The cold war is still on, however, between buyers and sellers, hence future trends are unpredictable. THE IRON AGE scrap price composite this week is \$41.83 a gross ton, up \$1.25 from last week due to the change at Philadelphia.

THE first boatload of unprepared scrap bought from the Chinese Government for Bethlehem Steel in on the way to the United States. Another boatload is being loaded. This shipment, part of an original order of 40,000 tons, is not a part of the much discussed million tons which Bethlehem recently was said to be buying. Reports from China say it may be some time before any material under the bigger order is shipped out of that country. This report is based on the difficulty with which the shipper is making good an original commitment of 40,000 tons of scrap.

Steel ingot production this week, while again matching peacetime highs from a tonnage standpoint, continues unchanged from last week's revised figure of 96 pct of rated capacity. The capacity of operations figure is now based on the Jan. 1, 1948, capacity of 94.2 million tons annually.

There is no indication of any serious decline in steel output for some months to come. It is not expected that the steel industry will face a steelworkers' strike even though a wage increase will be asked for and granted.

• **SEEK REVERSAL**—For the first time the legality of the so-called basing point system has reached an upper court for ultimate determination, without the related charges of combination or conspiracy prohibited by the Sherman act or the price discriminations covered by the Robinson Patman act. The case presented Jan. 19 in Chicago was started by the conduit makers in an effort to see reversal of the FTC cease and desist order of selling conduit on a base point system. Some of the companies involved are General Electric, Republic Steel Corp. and Youngstown Sheet and Tube.

• **SOLD TO COLUMBIA**—Sale of the surplus aluminum reduction plant at Torrance, Calif., to Columbia Steel Corp. for \$4.2 million has been announced by WAA. Should the sale be approved by the Dept. of Justice, Columbia plans to remove some of the present buildings and erect a cold rolling mill on the property. Original cost to the government of the facilities was about \$12.9 million and the present appraised value is about \$5 million. Columbia will pay the government \$500,000 down and the remainder when the transaction is completed.

• **BOTTOM FALLS OUT**—Production at the 10-4 bar mill at Gary works, Carnegie Illinois Steel Co., in the process of recovering from a slowdown strike by crane men, received another setback recently when the bottom of the billet heating furnace fell out. The mill was forced to go down completely for over a week. A large spring company in Gary, plus many other users, received severe setbacks on their deliveries off this mill. The furnace is now back in operation.

• **DETROIT ARBITRARY BASING POINT 7**—A major steel company has spread the word unofficially that it will eliminate the Detroit arbitrary basing point. Its sheet and strip will be sold on a Cleveland base plus freight to Detroit. This will decrease the freight absorption to Detroit by \$3.04 per ton. Other companies have taken no action up to press time.

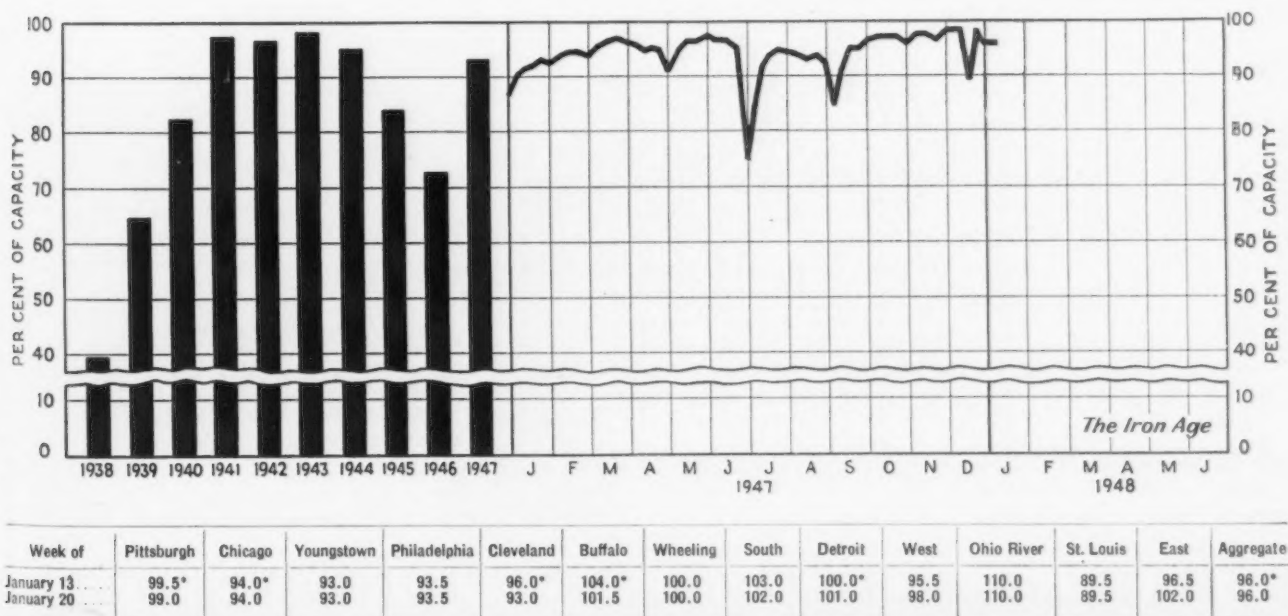
• **LOCOMOTIVES**—During the next 3 years General Electric will supply Argentina with 95 diesel-electric locomotives under the terms of a contract recently signed between the company and the Argentine State Railways. Covering 60 single-unit and 35 double-unit engines, plus spares, the contract will approximate \$18 million. Deliveries are scheduled to begin early in 1949 and will continue for a 15-month period. The locomotives are of three types, ranging from 70 to 170 tons in size, and rated from 800 to 2000 hp.

• **EXPORT CONTROL**—Shipments of any commodities to Europe will require individual validated export licenses beginning March 1, the Commerce Dept. has announced. The Department's Office of International Trade said the new licensing policy was designed to insure a careful programming of the supply of essential goods to areas of greatest need, and to limit the shipment of commodities which can make no contribution to world recovery. No change was made in forms required for obtaining licenses.

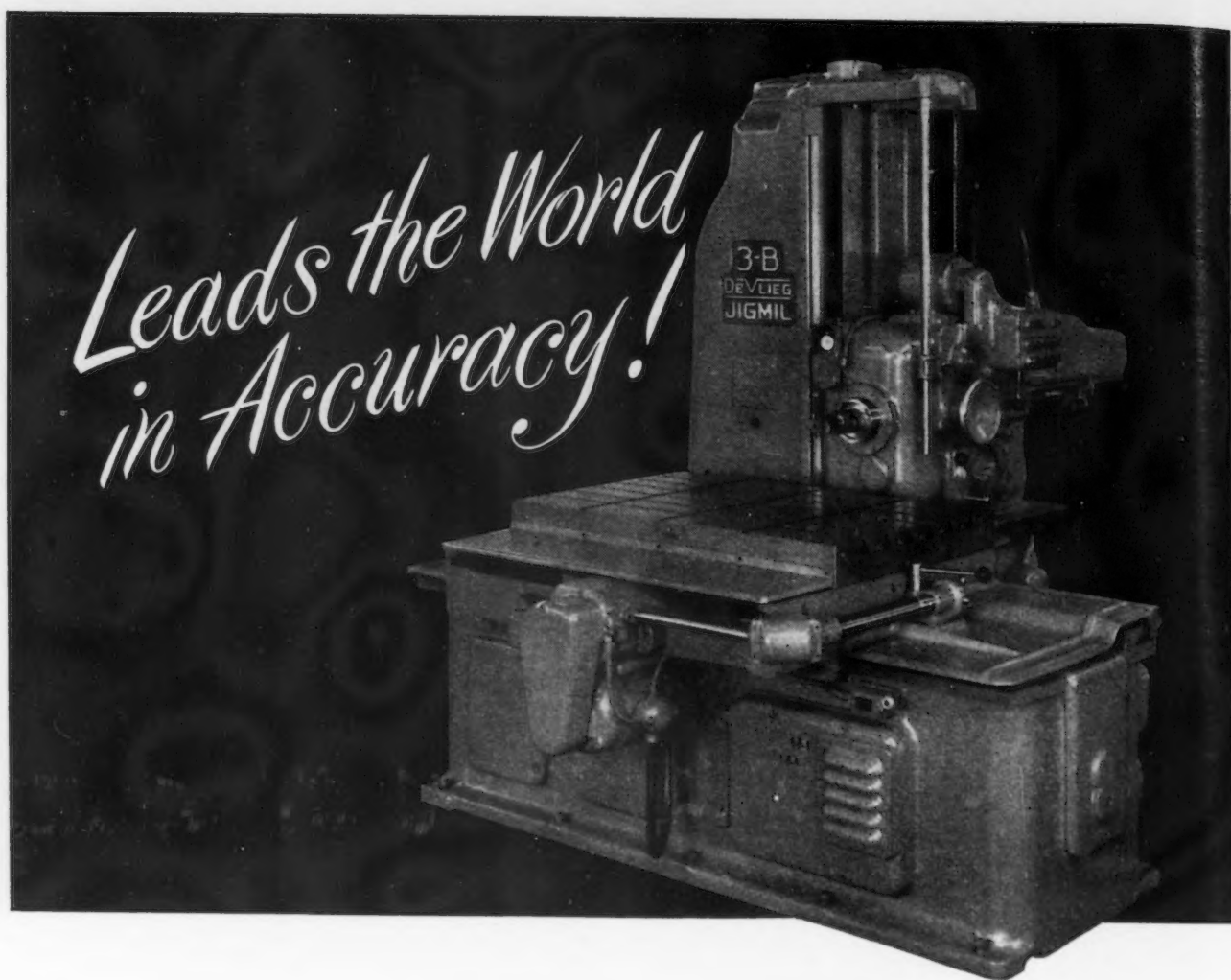
• **A FOR EFFORT**—A group of steel hungry consumers whose quota shipments of sheets from the mills have not been adequate have commissioned their labor relations counsel to try to obtain the needed tonnages elsewhere. The labor expert is looking for cold rolled sheets 14 to 24 gage, 36 to 48 in. wide drawing quality, and, although he doesn't know a sheet from a slab, he's trying hard to fulfill the assignment.

• **BUYS FURNACE**—Koppers Co. Inc., will acquire all outstanding stock of Missouri-Illinois Furnaces, Inc., a company formed to buy the government owned Granite City blast furnace and coke plant. Price was \$3,255,000. Koppers has been operating the plant for the government since 1941. Koppers is taking over the Hanna Coal and Ore Corp. interest in the company and states that it is committed to continue the same distribution pattern that has been established during the years of Koppers' operation.

Steel Ingot Production by Districts and Per Cent of Capacity



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Steel Industry to Cooperate on Voluntary Allocation Plans

New York

• • • The steel industry obeys the law. It will agree to voluntary allocation. But that does not mean that steel officials believe the voluntary government-industry allocation plan will work as good or any better than current steel distribution.

There is so much steel being made. A little more will be made this year than last year. But any system that will take away from some people and give more to others is bound to produce more headaches for the industry.

The allocation of steel is far more complex than many steel heads know. The ones who really know are those who sweated it out during the war under three or four successive attempts. The last one—Controlled Materials Plan—only worked because it matched demand with actual anticipated output of specific steel products.

There is no belief in steel circles that CMP is going to be revived. It can't be at this time. Measures to comply with the law will be the best that can be taken under a peacetime economy. At best they will mean that steel consumers now receiving steel will get less when and if major so-called essential groups get more under government suggestion and industry approval.

The allocation planning will come at a time when most steel companies have been putting out their lines to cement long-term customer relationships. Many of

See steel committee Makeup p. 103.

these will be wrecked. Steel companies who do not make the products which are needed for the special allocated projects will probably be asked to furnish the steel so that other companies can make the conversion.

There will be no disposition of steel companies who make allocated products to let other firms not making them get away without being affected by participation. It is expected that steel firms will have to cooperate in all of the plan's to the extent of their percentage of total steel ingot ca-

But Officials Expect Such A Setup to Eventually Distort Distribution

By TOM CAMPBELL
News-Markets Editor

capacity. That is what was done during the war.

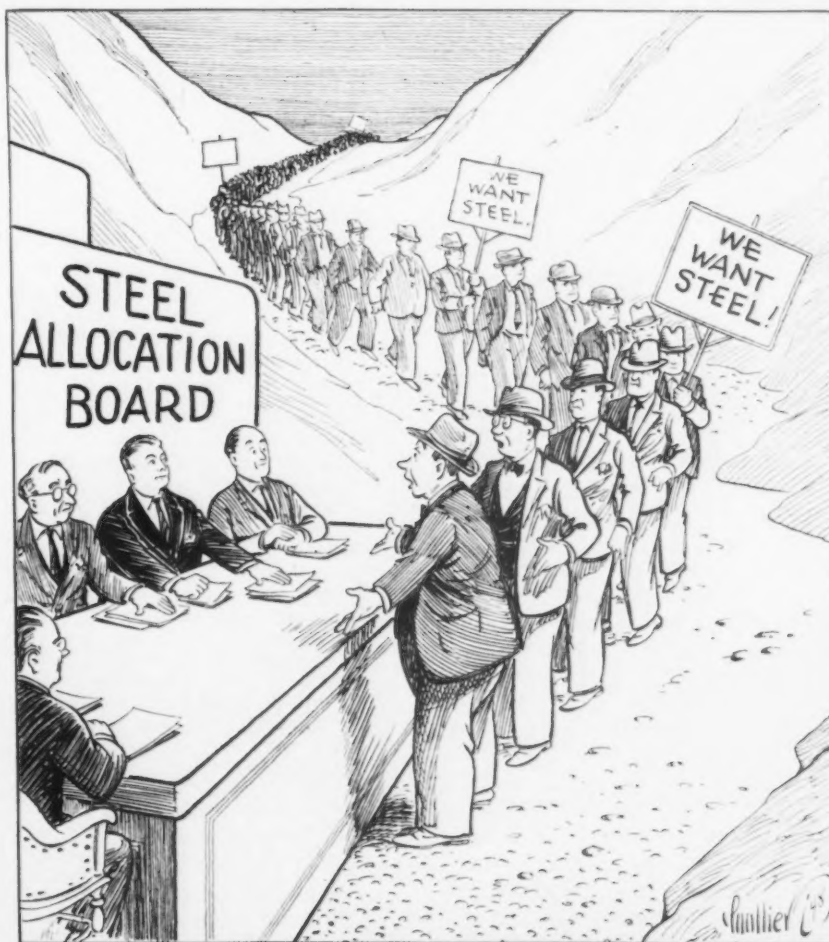
Sadly enough, cooperative help carried out in the industry to take care of real emergency cases in the past is doomed. There would be no percentage to willingly do something only later to be told to do something more again.

Steel companies will send their strongest men to Washington to see that their interests are pro-

ected. There is no naive belief among steel officials that any of their conferees would miss a chance to make a good customer relationship anywhere and at any time. If such is the case, steel firms want to have a johnny-on-the-spot at least.

No one will try to wreck the allocation plan when it is set up. It will wreck itself. The nearness of it has already caused steel users to see the Frankenstein they have set in motion. Steel brass did not ask for what's coming. The government, it claims, was goaded into this because of consumer complaints. Hind sight by steel users is scaring hell out of some of the very ones who yelled the loudest for allocations. Such is life!

It Won't Be Long Now



FTC Will Not Base Steel Case Arguments on Cement Industry Case

Pittsburgh

• • • The Federal Trade Commission will not base its case against the steel industry on the cement industry case. This is the opinion of steel company lawyers here who believe that instead, the Milk & Ice Cream Can Institute decision will form a basis for the government's arguments. The latter was won by FTC in a Circuit Court of Appeals' decision handed down Jan. 7, 1946. The FTC lost a Circuit Court decision in the cement industry case on Sept. 20, 1946 and appealed it to the U. S. Supreme Court, where it was argued Oct. 21 and 22, 1946.

This is a surprise to some attorneys because the Milk and Ice Cream Can Institute action (not to be confused with the Can Manufacturing Institute) appears to have been decided largely on the basis of a conspiracy to fix prices and trade practices. It is true that the members of that institute were charged with setting prices so that a customer paid the same delivered price regardless of the producing point. They were also charged with maintaining, by agreement, a freight equalization plan.

It is interesting to note that Circuit Judge J. Earle Major delivered the majority opinion in the cement case against the FTC and in the Can Institute case in favor of the FTC. In the former he held that "in our judgment, the question as to whether the basing point system should be declared illegal rests clearly within the legislative domain." The court held that the FTC had not sustained its charge of conspiracy in the quoting of cement prices.

In the can case won by FTC it was stated that members used a so-called reporting system by which the activities of each, including prices received from sales, are embodied in a daily report and sent to the institute. The Commission found that such system was "to assure the maintenance of uniform prices" and that it was designed to and did permit the institute to supervise the price activities of its members.

In view of the Circuit Court decision in the cement case it appears that the reliance of the FTC

Milks & Ice Cream Can Case Expected Basis of Case Against Industry

• • •

By GEORGE SULLIVAN
Pittsburgh Regional Editor

• • •

in the steel industry case will be upon its price-fixing conspiracy charge. It was on that basis that the Milk & Ice Cream Can Institute action was largely decided. The FTC apparently realizes that it might not be successful in a frontal attack on the multiple basing point system used in steel marketing. But if it could prove conspiracy the result might be favorable to it.

Except for advertising and publicity releases using figures culled from the trade press, and annual price statistics secured the same way, the American Iron & Steel Institute is not believed to be vulnerable on the price con-

spiracy question. In this it differs from the alleged practices of the Milk & Ice Cream Can Institute.

Steel company lawyers believe their current case and the can institute case are poles apart. They also maintain that there are many points of difference between the steel action and that of the cement industry. A Supreme Court decision against the FTC in the cement case won't stop this action, informed observers believe. Neither would one against the cement industry cause the steel company lawyers to cry quits.

Washington

• • • Lynn C. Paulson, assistant chief trial counsel for FTC, this week prepared to issue subpoenas for sales and traffic managers in respondent firms, ordering them to bring to the Feb. 2 meeting their company price lists and books of extras. Mr. Paulson says if the industry is unable to present these records by Feb. 2, he will proceed with "other matters" on that date. "Other matters" presumably include introduction of papers relating to identical bids on Federal Government projects. The hearings are expected to continue for at least 2 weeks—before another recess is called.

Sustaining the objection of industry counsel, Mr. Hier ruled inadmissible the introduction of a number of documents dating from the effective period of the National Industrial Recovery Act. FTC counsel probably will seek admission of many of these discarded documents at a later date, however.

Hoyt A. Moore, counsel for Bethlehem Steel Corp., objected to the volume of material which Mr. Paulson sought to introduce. "We don't want a lot of baled hay without any indication of a needle," he said.

Mr. Paulson countered with "counsel for the respondents will not see the method in my madness until later." This was obviously a plain hint that he will later attempt to show that AISI exists primarily for the purpose of fixing prices and dominating markets and heads a "conspiracy" to hold down productive capacity.

Maps Miss

Pittsburgh

• • • Exhibits submitted by FTC at last week's hearings included maps, showing basing points of major steel products. A note on each states that basing points were taken from THE IRON AGE, Jan. 1, 1948. The reference is apparently to the basing point chart included as an insert in that issue.

Steel company lawyers are chuckling over some of the maps. That supposedly illustrating hot-rolled sheet basing points shows only about half the points listed in THE IRON AGE insert. And it makes no distinction between hand-mill and continuous mill hot-rolled sheets, which are of course different products, in thickness, quality and price.

Also attached to each map is a list of producing points with companies and capacities. Mill locations a few miles from Pittsburgh, Chicago, Birmingham and other steel centers are shown as producing points at which there are no basing points. The fact that a mill is in the switching district is apparently considered irrelevant.



Aluminum Ingot Shortage Confounds the Crystal Ball Gazers

New York

•••Two and half years after the war—America finds itself going into an aluminum ingot shortage. At the end of the war, the metals experts had a lot of fun second guessing the future of the huge war-developed aluminum facilities in this country. Now, the sections of the industry that are operating find themselves swamped with business. Those that are out of operation cannot get enough power to get into operation.

Alcoa, the largest primary ingot aluminum producer in this country, last year was able to operate at 97 pct of its economical capacity, but Reynolds Metals would be able to produce 63 pct more aluminum if electric power were available. Alcoa reports that a temporary power shortage in the South during last year accounted for a part of the small amount that company produced below its capacity.

According to R. S. Reynolds, president of Reynolds Metals Co., that company is losing 87,500 tons of aluminum production per year due to the power shortage. According to his statement, eight plants are tied up in the power shortage in this country. Two of

Producers Now Swamped With Orders; Power Shortage Cuts Down Output

By JACK R. HIGHT
Ass't News-Markets Editor

them are owned by Reynolds, and six by the government.

Inasmuch as their power situation is permanently bad, three of the government-owned war-built plants have already been stripped out. The largest of them, just outside New York City at Maspeth, L. I., was able to produce 144,000 tons of ingot per year. It is a warehouse today. So is the 54,000 tons plant at Burlington, N. J. The third plant, located at Torrance, Calif., has also been gutted. Two other plants at Messina, N. Y., and Riverbank, Calif., still have the works, but lack the power for operation.

The sixth government plant hit by the power shortage is the one at Jones Mills, Ark. Reynolds Metals leased half of that plant. For lack of power, the other half

of the plant, costing the government \$10,100,000 and having 36,000 tons of capacity, nets the government nothing. With Reynolds' management already there, the idle second half of this plant can be brought into production the instant a supply of power becomes available.

Both of Reynolds Metals privately owned plants have been seriously handicapped by the power shortage. The one at Longview, Wash., is completely shut down and the one at Listerhill, Ala., is operating at only 60 pct of its full capacity. In all, about 51,500 tons of capacity at these two mills are being kept idle for lack of power. Both of these plants were financed with funds borrowed at 4 pct interest from the RFC. Although the government is getting nothing from the idle plants which it financed directly, Reynolds Metals continues to pay the RFC that 4 pct and amortization charges on the funds invested in these idle plants.

In the face of all the damage already done to the aluminum producers, it is amazing that the Federal Power Commission declared recently that "the supply available will be adequate to meet all essential needs if there is full as-

sistance and cooperation in this situation on the part of electric companies, manufacturers of electrical equipment, state commissions and the Federal Power Commission." The fact is that so essential a need as aluminum production cannot get the power it requires. The power shortage has been hurting the nation for many months. Millions of pounds of aluminum are being lost each week.

Considering the above situation, with the aluminum ingot situation spotty last year, and developing into a serious shortage at the end of the year, the position of the huge Canadian capacity in relation to the American need is a strange one.

The Aluminum Co. of Canada has a practical capacity of 400,000 tons per year, nearly all centered at one location, Arvida. (See THE IRON AGE, Apr. 5, 1945, p. 113.) During last year, this plant was known to be operating at far below capacity, possibly slightly over 50 pct. At the same time, Canada was in desperate need of an expansion of exports to the U. S. to rescue its swamped balance of trade.

The pattern of Canadian aluminum exports to the U. S. last year was an erratic one, as can be seen from the monthly figures:

Jan.	323 tons
Feb.	127 "
Mar.	4034 "
Apr.	2940 "
May.	3137 "
June	3378 "
July	603 "
Aug.	None

Sept.	51 "
Oct.	25 "
Nov.	603 "

This pattern corresponds roughly inversely with the aluminum demand figures in the past year. At the beginning of the year, business was good in aluminum. In the second quarter of the year, there was a recession in the aluminum business, at the same time that Canadian shipments increased sharply.

Whatever the reason for the sudden increase in shipments to the U. S. when business was the poorest, it is certain that Canadian aluminum could be completely eliminating the ingot shortage in this country if that

company chose to do so. Idle capacity there is large enough to transfer the shortage into a surplus.

The Canadian company states that there is no difficulty with water supplies to keep its capacity in operation, despite reports to the contrary in this country. According to statements made to THE IRON AGE previously, there is adequate water to keep all of the installed horsepower in operation under any conditions. Canadian officials also state that adequate labor is available for the work.

There are reports that new potlines are coming into operation at Arvida, but the company is reluctant to furnish details at this time.

2nd Annual Material Handling Exposition Breaks All Records

Cleveland

• • • The second annual national Material Handling Exposition and the concurrent conference on materials, held here Jan. 12 to 16, attracted more than 15,000 management executives and engineers, more than double the attendance recorded at the previous year's meeting. The exhibition of material handling equipment at the Public Auditorium represented the largest collection of such machinery the industry has ever achieved.

The technical sessions, featured a special national meeting of the management and material handling sections, ASME, on Jan. 13 and 14.

One of the highlights of this session was a large scale demonstration of advanced techniques of material handling. This demonstration, with live actors, was held in the arena of the auditorium. Motion pictures held a dominant position in the educational phases of the meeting with 31 films, produced by 23 companies, shown during the show.

The necessity of stepping up productivity per man and per machine through making ingenious and intensive use of better processes, improved products and close coordination between the systems of production and distribution was stressed by Earl Bunting, president, O'Sullivan Rubber Co., and board chairman of NAM, in an address at a banquet on Wednesday.

(CONTINUED ON PAGE 106)

FBI Requests Aid in Running Down Hijacked Steel

Chicago

• • • The Federal Bureau of Investigation has asked IRON AGE readers to be on the lookout for 22 tons of Carnegie-Illinois Steel Corp. cold rolled sheets highjacked last week in Chicago. The sheets were left in a parked trailer at the corner of 106th and Indianapolis Blvd., in Chicago, to await pickup by another tractor.

Between the hours of 6:30 p. m. and midnight on Jan. 12 the trailer was stolen. The trailer was found the next morning at the 9600 Block on Ewing St., or about 1 mile from the point of theft.

The FBI told THE IRON AGE that the trailer traveled a total of 17 miles after theft, and that the lifts

of sheets must have been unloaded from the trailer by a derrick or crane.

The FBI would appreciate any information regarding the stolen sheets so that the theft could be traced. It is entirely possible that an innocent steel customer may end up with the hot sheets which, if not reported, might preclude bringing the thieves to justice.

Details of the missing shipment are: total weight 46,635 lb., 2601 sheets, 32 in. x 95 in. x 25 gage, cold rolled and oiled. Four bundles put in 2 lifts separated by blocking and banded, lifts stenciled with Carnegie-Illinois Steel Order No. B45118,

customer order, Hub Stamping and Mfg. Co., 2241, weight 36,915 lb. One bundle of 2 lifts stenciled Carnegie-Illinois Steel Order B68563, customer order 2329, weight 9720 lb.

Carnegie reported the sheets are not stamped or marked in any way. Willard Trucking Co. owned the trailer. Any information regarding this shipment should be immediately reported to H. K. Mudd, care of Federal Bureau of Investigation, 1900 Bankers Bldg., Chicago, or THE IRON AGE. This is the second shipment of Carnegie-Illinois which was highjacked. There are reports of other cases of highjacking in the Chicago and Midwestern area.

Fantastic Stock Deal Startles Even Old Timers in Market

New York

• • • One of the most fantastic stock deals in the history of Wall Street ballooned to gigantic proportions last week and was finally exploded by the heat of official investigations by the Securities and Exchange Commission and the New York States Attorney General's office, as well as unofficial investigations by Wall Street and half the news sleuths of this city. The pawn in the palm of a group of engaging entrepreneurs was the Follansbee Steel Corp., Pittsburgh, over which sale rumors had been floating for several weeks.

No Hollywood thriller was ever more packed with weird and confusing details than this abortive deal. This is a story of lawyers and business men—of speculators and gray markets—of reputable and disreputable—with a hint of the underworld thrown in, just for spice.

The confusion all started last Monday when it was reported that a Mr. Alan Adams Haye had purchased 183,000 shares of Follansbee capital stock for \$50 each—this at a time when the stock was quoted on the New York Stock Exchange at just under \$40 per share.

News men, who at first thought they were handling a routine story, were stymied by their inability to find Mr. Haye, or, for that matter, anyone who knew him personally. The too-generous offering price for the stock and the apparently ethereal quality of Mr. Haye, added to a labyrinth of confusing and contradictory information, soon aroused the interest of the Attorney General's office, as well as the Securities and Exchange Commission.

The trail led to a heretofore unheard of organization which identified itself as 625 Associates, Inc., and which apparently had obtained options on the 183,000 shares, or 70 pct of Follansbee stock. Thus it seemed that an unheard of organization had sold a steel corporation to an unheard of man.

Investigation by THE IRON AGE

Deal Involving Follansbee Weirdest in Century; Flops With Airing

By BILL PACKARD
Associate Editor

revealed that this baffling organization was formed for the specific purpose of gaining options on a controlling number of shares of Follansbee Steel Corp. stock and then selling the controlling interest in the corporation. According to Mr. Asa B. Kellogg, counsel and secretary for the organization, "The 625 Associates, Inc., had no other function or interests."

Regarding the unusual name of the organization, Mr. Kellogg explained that the numbers 6-2-5 stand for the sixth, second and fifth letters of the alphabet. Thus 625 equals FBE, which is the Wall Street teletype designation for Follansbee. Simple, isn't it?

The other officers of 625 Associates, Inc., were Henry M. Brooks, president, and Dr. Louis Cohen, treasurer, both of whom were subpoenaed by the Attorney General's office. Also subpoenaed was A. Terry Fahye (also spelled Fey), alias A. Albert Bennette, Alias Alan Adams Haye and born Albert Fagenbaum, who is described as president of Consolidated Steel Mills Co. Mr. Fahye is reported to have acted as broker in the deal.

By this time the deal had ballooned as far as it could, and, since the pressure was continuing, it did the only thing it could do. It burst. The explosion of the deal became apparent when Mr. Brooks advised the shareholders of Follansbee Steel who had indicated their willingness to sell their stock at the too-generous offering price that "the contract of purchase . . . has been breached by the purchaser and therefore we are treating your authorization to us as no longer effective."

As attorney for 625 Associates, Inc., Mr. Kellogg said that he

dealt "personally" with A. Terry Fahye and with his attorney, Col. David Marcus (Mr. Marcus was the third one declared to be counsel for the buyers, others having been mentioned were Mr. Kellogg and Myron M. Cowen).

Authorities were also investigating a possible connection of Irving (Waxey Gordon) Wexler, ex-beer baron, with the deal. A trip to the files of the *New York Post* of Sept. 22, 1944, revealed a story wherein Waxey was receiving the hot foot from members of a Senate committee investigating the national defense program.

"In general, his story was simple enough: He was a poor fellow 'trying to make a dollar' as an employee of Consolidated Industries, which shared offices with World Wide Mercantile Corp" of which Albert Terry Fayhe was treasurer.

Meanwhile Attorney General Nathaniel L. Goldstein reported that it had been established that A. Terry Fahye and the Mythical Mr. Haye are one and the same. He also revealed that Fayhe was barred perpetually in 1939 from engaging in security dealings in New York. Fahye finally surrendered to the Attorney General on Monday after almost a week of subpoena-dodging.

Advisory Committee Is Appointed by Harriman

Washington

• • • A 23-man advisory committee has been appointed by Commerce Secretary W. Averell Harriman to supervise the steel industry's voluntary allocation program. Members of the advisory committee are: J. T. Whiting, president, Alan Wood Steel Co.; C. R. Hook, president, American Rolling Mill Co.; C. F. Stone, chairman, Atlantic Steel Co.; A. B. Homer, president, Bethlehem Steel Co.

W. R. Howell, president, Bliss & Laughlin, Inc.; Wilburt Wear, president, Harrisburg Steel Corp.; C. W. Meyers, president, Colorado Fuel & Iron Corp.; E. L. Parker, president, Columbia Steel & Shaft-

(CONTINUED ON PAGE 106)

PERSONALS . . .

(CONTINUED FROM PAGE 93)

• **Hugh Comer** has been elected to the board of directors of Allis-Chalmers Mfg. Co., Milwaukee. Mr. Comer is president and treasurer of Avondale Mills and chairman of the board of Boaz Mills, Inc.

• **Donald W. Rennewanz** has been appointed manager, Pacific sales district, San Francisco, Hotpoint, Inc., a General Electric Co. affiliate. He first joined Hotpoint in 1938, and in 1945 was made sales manager of the range division.

• **C. C. Cummings** has been promoted to parts control manager of Twin Coach Co.'s Kent, Ohio, plant. He joined the service department of Twin Coach in 1931. Since then he has served in the production control and process engineering departments.

• **Philip H. Zuiderhoek** has been named factory manager of the Tuscaloosa, Ala., plant of the B. F. Goodrich Co. He succeeds **Joseph C. Herbert**, who has been assigned other duties with the company. Mr. Zuiderhoek has been with the company since 1929, and had been production superintendent at the Miami plant since 1945.

• **Erwin G. Somogyi** has been appointed to the newly-created position of assistant director of research of the plastics division of Monsanto Chemical Co., Springfield, Mass., in charge of process development.

• **Henry V. Erben** has been elected a vice-president of the General Electric Co., Schenectady, and has also been made general manager of the apparatus department. He succeeds **Roy C. Muir**, who has retired after more than 42 years' service. Mr. Erben has been a commercial vice-president of GE since 1944 and the following year he was named assistant general manager of the apparatus department. **John D. Lockton**, assistant treasurer since 1934, has been elected treasurer, succeeding **Jesse W. Lewis**, who has retired after more than 37 years of service with the company.



PAUL H. MAURER, director of engineering, Redmond Co., Inc.

• **Paul H. Maurer**, former executive engineer of Redmond Co., Inc., Owosso, Mich., has returned to the company after a 3-year absence to assume the newly-created post of director of engineering, in which he will be in charge of all engineering work in the company, including research, development and product engineering. Coming to Redmond Co., Inc., originally from the Hudson Motor Car Co., in 1943, he left Redmond 18 months later to become manager of industrial sales and later chief engineer for the National Pneumatic Co.

• **James E. Burke**, formerly general superintendent of the Barcalo Mfg. Co. in Buffalo, has been appointed manager of the Chicago plant of the Superior Sleeprite Corp.

• **Alwyn A. Throckmorton**, former deputy director of the War Assets Administration Metals Div. and regional director of the WAA's Region II in New York, has been named manager of scrap procurement for the Kaiser Aluminum Div. of the Permanente Metals Corp., Oakland, Calif.

• **John S. Krauss** has retired as manager of the L. H. Gilmer Div. of U. S. Rubber Co., Philadelphia, after 35 years of service. He will be succeeded by **Lawrence K. Youse**, former technical superintendent of the V-belt plant and recently assistant manager.

• **David J. Taylor**, former Allis-Chalmers sales representative in Milwaukee, has been appointed sales manager of the Mid-West Laundry Machinery Co. of that city.

• **H. E. Shumway** has been appointed assistant to the president of Union Pacific R.R. with headquarters at Omaha. Mr. Shumway moves into a newly-created position from general superintendent of transportation, a post which he has held for over 2 years. Succeeding Mr. Shumway is **A. D. Hanson**, general superintendent at Salt Lake City. **V. W. Smith**, superintendent of the Los Angeles division, has been named general superintendent at Salt Lake City. **D. F. Wengert**, assistant superintendent at Las Vegas, Nev., succeeds Mr. Smith as superintendent of the Los Angeles division, and **W. B. Groome**, trainmaster at Salt Lake City, succeeds Mr. Wengert. **G. A. Cunningham**, trainmaster at Las Vegas, has been made assistant superintendent at Pocatello, Idaho.

OBITUARY...

• **W. S. Mosher**, 74, chairman of the board of the Mosher Steel Co., Houston, died Jan. 8. Mr. Mosher had been connected with the company since 1890 and was its president from 1921 to 1944.

• **H. C. Esgar**, sales engineer, stainless steel division, Carnegie-Illinois Steel Corp., Pittsburgh, died suddenly on Dec. 31 after an illness of 3 weeks.

• **William Bowden, Jr.**, assistant personnel director of the central office of General Motors Corp., Detroit, died recently.

• **Prescott R. Lovejoy**, 45, president and general manager of the Lovejoy Tool Co., Inc., Springfield, Vt., died Dec. 24.

• **Julian F. Gordon**, assistant manager of the stainless steel division, Carnegie-Illinois Steel Corp., Pittsburgh, died Jan. 13. He had been with Carnegie-Illinois since 1936 after service with Republic Steel Corp. and the American Iron & Steel Institute.

AMERICAN IRON AND STEEL INSTITUTE

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

YEAR 1947

(Preliminary)

Period	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL		Calculated weekly production, all companies (Net tons)	Number of weeks in month
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,544,841	95.1	384,096	87.7	284,309	65.9	7,213,246	93.0	1,628,272	4.43
February	5,830,371	93.8	314,912	79.6	276,779	71.1	6,422,062	91.7	1,605,515	4.00
March	6,614,369	96.1	378,893	86.5	314,224	72.9	7,307,486	94.3	1,649,545	4.43
1st Quarter	18,989,581	95.0	1,077,901	84.8	875,312	69.9	20,942,794	93.1	1,628,522	12.86
April	6,360,600	95.4	375,675	88.6	306,422	73.4	7,042,697	93.8	1,641,654	4.29
May	6,634,716	96.4	372,878	85.2	321,903	74.6	7,329,497	94.5	1,654,514	4.43
June	6,312,674	94.7	351,247	82.8	304,744	73.0	6,968,665	92.8	1,624,397	4.29
2nd Quarter	19,307,990	95.5	1,099,800	85.5	933,069	73.7	21,340,859	93.7	1,640,343	13.01
1st 6 Months	38,297,571	95.3	2,177,701	85.2	1,808,381	71.8	42,283,653	93.4	1,634,467	25.87
July	6,028,707	87.8	256,125	58.6	285,322	66.3	6,570,154	84.9	1,486,460	4.42
August	6,324,456	91.9	346,033	79.0	311,597	72.2	6,982,086	90.1	1,576,092	4.43
September	6,147,448	92.4	334,425	79.0	306,769	73.6	6,788,642	90.6	1,586,131	4.28
3rd Quarter	18,500,611	90.7	936,583	72.2	903,688	70.7	20,340,882	88.5	1,549,191	13.13
9 Months	56,798,182	93.7	3,114,284	80.8	2,712,069	71.4	62,624,535	91.8	1,605,757	39.00
October	6,826,543	99.2	384,272	87.8	349,520	81.0	7,560,335	97.5	1,706,622	4.43
November	6,538,179	98.1	360,620	85.0	334,236	80.0	7,233,035	96.3	1,686,022	4.29
December	6,655,019	96.9	373,367	85.5	341,210	79.3	7,369,596	95.3	1,667,329	4.42
4th Quarter	20,019,741	98.1	1,118,259	86.1	1,024,966	80.1	22,162,966	96.4	1,686,679	13.14
2nd 6 months	38,520,352	94.4	2,054,842	79.1	1,928,654	75.4	42,503,848	92.5	1,617,961	26.27
Total	76,817,923	94.8	4,232,543	82.1	3,737,035	73.6	84,787,501	92.9	1,626,151	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,553,721 net tons open hearth, 98,849 net tons Bessemer and 97,358 net tons electric ingots and steel for castings, total 1,749,928 net tons; based on annual capacities as of January 1, 1947 as follows: Open hearth 81,010,990 net tons, Bessemer 5,154,000 net tons, Electric 5,076,240 net tons, total 91,241,230 net tons.

* Revised

† Preliminary figures, subject to revision.

YEAR 1946

Period	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL		*Calculated weekly production, all companies (Net tons)	Number of weeks in month
	*Net tons	Percent of capacity	Net tons	Percent of capacity	*Net tons	*Percent of capacity	*Net tons	Percent of capacity		
January	3,530,192	51.1	207,512	47.4	135,183	28.9	3,872,887	49.6	874,241	4.43
February	1,301,719	20.9	25,905	6.6	65,058	15.4	1,392,682	19.8	348,171	4.00
March	5,950,241	86.2	363,949	83.1	194,574	41.6	6,508,764	83.3	1,469,247	4.43
1st Quarter	10,782,152	53.8	597,366	47.0	394,815	29.1	11,774,333	51.9	915,578	12.86
April	5,336,317	79.8	286,088	67.5	238,790	52.8	5,861,195	77.5	1,366,246	4.29
May	3,702,184	53.6	153,409	35.0	217,027	46.4	4,072,620	52.2	919,327	4.43
June	5,148,660	77.0	251,253	59.2	225,860	49.9	5,625,773	74.4	1,311,369	4.29
2nd Quarter	14,187,161	69.9	690,750	53.7	681,677	49.7	15,559,588	67.9	1,195,971	13.01
1st 6 months	24,969,313	61.9	1,288,116	50.4	1,076,492	39.4	27,333,921	59.9	1,056,588	25.87
July	6,027,388	87.5	365,332	83.6	225,963	48.5	6,618,683	84.9	1,497,440	4.42
August	6,291,363	91.1	373,837	85.4	259,322	55.5	6,924,522	88.7	1,563,098	4.43
September	5,951,232	89.2	371,465	87.8	232,869	51.6	6,555,566	86.9	1,531,674	4.28
3rd Quarter	18,269,983	89.3	1,110,634	85.6	718,154	51.8	20,098,771	86.8	1,530,752	13.13
9 months	43,239,296	71.1	2,398,750	62.2	1,794,646	43.6	47,432,692	69.0	1,216,223	39.00
October	6,312,604	91.4	387,933	88.6	251,205	53.8	6,951,742	89.0	1,569,242	4.43
November	5,873,264	87.8	318,350	75.1	266,157	58.8	6,457,771	85.4	1,505,308	4.29
December	5,286,799	76.7	222,704	51.0	250,998	53.8	5,760,501	73.9	1,303,281	4.42
4th Quarter	17,472,667	85.3	928,987	71.5	768,360	55.4	19,170,014	82.8	1,458,905	13.14
2nd 6 months	35,742,650	87.3	2,039,621	78.5	1,486,514	53.6	39,268,785	84.8	1,494,815	26.27
Total	60,711,963	74.7	3,327,737	64.6	2,563,006	46.6	66,602,706	72.5	1,277,382	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,558,041 net tons open hearth, 98,849 net tons Bessemer and 105,491 net tons electric ingots and steel for castings, total 1,762,381 net tons; based on annual capacities as of January 1, 1946 as follows: Open hearth 81,236,250 net tons, Bessemer 5,154,000 net tons, Electric 5,500,290 net tons, total 91,890,540 net tons.

* Revised January through December, 1946.

Industrial Briefs . . .

- **STEEL PRODUCTS**—Announcement has been made of the formation of the Harold R. Rubin Co., steel products, with offices at 1235 Lafayette Bldg., Detroit 26.
- **INCREASES OUTPUT**—A \$250,000 storage addition to the Baldwin-Duckworth Div. of Chain Belt Co., Worcester, Mass., to be in operation Apr. 1 has been started. Space now used for storage will revert to manufacturing and output increased about 50 pct.
- **FIBERGLAS GROWS**—Owens-Corning Fiberglas Corp. of Toledo has recently opened for business the New York City Fiberglas Bldg. at 16 E. 56th St. The building is an unusual structure, for in addition to housing the company's New York staff, it serves as a permanent demonstration of the wide range and numerous applications of glass in fiber form.
- **SALES REPRESENTATIVE**—John S. Barnes Corp., Rockford, Ill., manufacturers of hydraulic structures, controls, and fluid power units, has announced the appointment of the B. W. Rogers Co., 850 South High St., Akron, Ohio, as its sales representative.
- **CHANGES NAME**—The Atlas Tool & Designing Co., Philadelphia has changed its name to Atlas Chain & Mfg. Co. and will manufacture roller chains.
- **ACQUISITION**—Tennessee Products & Chemical Corp., Nashville, Tenn., announced that, effective Jan. 1, it has been operating the plant of Southern Ferro Alloys Co. in Chattanooga as its Southern Ferro Alloys Div.
- **PLANT FOR SALE**—A modern surplus war plant in Salt Lake City, including 35 buildings containing approximately 1 million sq ft of floor space is being offered for sale by WAA. Offers to purchase must be received by the WAA Salt Lake City Regional Office by Jan. 30.
- **ENGINEERS DIVISION**—Robins Engineers Div. has been organized by Hewitt-Robins, Inc., New York City, to handle the contracting phases in the design, engineering and installation of complete material handling and processing plants.
- **TAKES OVER**—Peterson Products Corp. has taken over the business formerly operated by the Guyer Metal Products Corp. at 1735 West Armitage Ave., Chicago, and will continue the custom fabrication of extra deep cold-drawn and pressed metal products.
- **MOVES**—Nelco Tool Co., Inc., in the tungsten carbide milling field, has moved from Brooklyn, N. Y., to a new plant at 266 Center St., Manchester, Conn.
- **FORMS AMCA**—The American Metallizing Contractors Assn. has been chartered in the state of Illinois with an office at 773 Brownell Ave., St. Louis 22. William Fatka, president of Metallizing Inc., Chicago, is president.
- **STAMPING FIRM**—Marco Mfg. Corp., 21930 Grosbeck Highway, East Detroit, has been formed to produce stampings and stamping assemblies for the automotive industry.
- **MAGNESIUM CONSULTANT**—Brooks & Perkins, Inc., of Detroit has announced the opening of a Washington office at 261 Constitution Ave. Calvin H. Corey, division manager, will be available for consultation on the practical and economical use of magnesium.
- **METAL MANUFACTURER**—Havana Metals, Inc., Havana, Ill., has been formed and will engage in the manufacture and distribution of metal and gray iron products. George E. Keys is president and John W. Rourke, a director, will conduct the selling activities from a Chicago office.

Material Handling

(CONTINUED FROM PAGE 102)

Mr. Bunting's talk, entitled "The Kind of Bigness that Business Needs," emphasized that business and statesmanship go together. He also outlined the program sponsored by NAM to reduce inflationary pressures.

The exhibition of material handling equipment embraced some 200 exhibitors and covered 200,000 sq. ft. A large number of new models of material handling devices were shown for the first time, particularly in the industrial truck field. Demonstrations of the use of disposable cardboard pallets attracted special attention.

Approximately 1000 members attended the ASME sessions, according to Curtis H. Barker, Jr., secretary of the society's materials handling division and vice president, Pallet Sales Corp., New York. Speakers included: R. F. Weber, in charge of materials handling research, International Harvester Co., East Moline, Ill.; John Kunkel, supervisor of material movement, General Electric Co., Bridgeport, Conn.; Mr. Barker; Ezra W. Clark, materials handling consultant, Battle Creek, Mich.; Fred Miller, industrial engineer, E. I. du Pont de Nemours and Co., Wilmington, and Richard Muther, methods engineering counsel, Pittsburgh.

Advisory Committee

(CONTINUED FROM PAGE 103)

ing Co.; R. K. Clifford, president, Continental Steel Corp.; D. S. Bell, president, Edgewater Steel Co.; Lauson Stone, president, Follansbee Steel Corp.

Also Hayward Niedringhaus, president, Granite City Steel Co.; E. L. Ryerson, chairman, Inland Steel Co.; Ben Moreell, president, Jones & Laughlin Steel Corp.; R. W. Wolcott, president, Lukens Steel Co.; P. W. Dillon, president, Northwestern Steel & Wire Co.; C. M. White, president, Republic Steel Corp.; L. E. Creighton, chairman, Rotary Electric Steel Co.

Also H. A. Roemer, chairman, Sharon Steel Corp.; B. F. Fairless, president, U. S. Steel Corp.; Frank Purnell, president, Youngstown Sheet & Tube Co.; E. T. Weir, chairman, National Steel Corp.; H. J. Kaiser, president, Kaiser Co., Inc.

Weekly Gallup Polls . . .

Wallace Strikes Serious Blow at Democratic Chances

Princeton, N. J.

••• First ballots returned from New York state in a nationwide poll on Henry A. Wallace's political strength today indicate that he would seriously jeopardize President Truman's chances of carrying New York state if either Governor Dewey or Gen. Dwight Eisenhower were the Republican nominee in an election held now, according to George Gallup, director, American Institute of Public Opinion.

If Sen. Robert A. Taft were the nominee, Mr. Wallace's candidacy would, in an election held at this time, be less of a threat to the Democrats, because Truman holds a substantial popular advantage over Taft.

Indications from these first New York state returns come from matching Wallace against Truman and various combinations of possible GOP nominees, as follows:

"If the presidential election were being held today and Truman were running for President on the Democratic ticket against Dewey on the Republican ticket and against Wallace on a third-party ticket, how do you think you would vote — for Truman, Dewey or Wallace?"

NEW YORK STATE FIRST RETURNS

Truman v. Dewey v. Wallace

	Pct
Truman	41
Dewey	44
Wallace	15

In succeeding questions General Eisenhower and Senator Taft were used, with the following results:

Truman v. Eisenhower v. Wallace

	Pct
Truman	31
Eisenhower	56
Wallace	13

Truman v. Taft v. Wallace

	Pct
Truman	47
Taft	35
Wallace	18

The above results are based on the total number of voters expressing an opinion. The no opinion vote was extremely low—6 pct in the Truman-Dewey-Wal-

lace race, 7 pct in the race involving Eisenhower and 10 pct in the race with Taft.

Judging by the above returns, which give only an early indication, Wallace's strength in New York state would run somewhere between 13 and 18 pct. But it should be remembered that New York can be expected to be one of his very strongest states. New York already has a third party—the American Labor Party—although it is plagued by dissension and resignation over the issue of endorsing Wallace.

From the early balloting in New York it would appear that the fears of certain Democratic politicians concerning the Wallace candidacy and its threat to Truman have considerable foundation, at least in the state which has the largest number of electoral votes (47).

The recent poll finds that roughly two-thirds of the Wallace vote comes from people who voted for Roosevelt in the last election. Less than 5 pct comes from people who voted Republican before, while the rest of Wallace's strength comes from new young voters and from people who did not vote in 1944.

There is no assurance, however, that Wallace will be able to hold these followers through the 10 months that lie ahead to election day. It is entirely possible that the Democrats will succeed in scaring voters away from Wallace by consistently pinning a Communist label upon him.

Future balloting will chart the trend of sentiment in what promises to be one of the most exciting and uncertain presidential races in recent history.

••• In reversing his last year's stand against tax relief, President Truman is reflecting a changed attitude on the part of the nation's voters toward income taxes.

Last June, when the President twice turned thumbs down on Re-

National Poll Shows Public Sentiment Is Now Veering Toward Cutting Income Tax

o o o

publican tax slashing proposals, 53 pct of the nation's voters polled by the institute felt that the public debt should be reduced before the taxes were lowered. Only 38 pct voted for tax cuts.

Today, with the tax question destined to be a hot issue in the presidential campaign, the situation is almost exactly reversed. Now slightly more than half the voters feel individual citizens should receive cost of living cuts in tax loads despite the urgent need to aid Europe and reduce the public debt. However, the preponderance of sentiment for tax cuts is still not overwhelming.

A nationwide survey of representative voters just completed by the institute asked this question:

"Some people say we should reduce income taxes now because of the high cost of living. Others say we should not reduce taxes now because we must give food and other aid to Europe and reduce our national debt first. What is your opinion on this—do you think income taxes should or should not be reduced now?"

	Pct
Should	51
Should not	36
No opinion	13

A similar question asked last spring brought this response:

	Pct
Should reduce taxes	38
Should not	53
No opinion	9

Taxpayers are feeling the pinch of payments to the government, as living costs rise weekly to new heights.

In recent years—particularly the war years—the majority of Americans showed a willingness to pay high taxes when the need (CONTINUED ON PAGE 119)

Construction Steel . . .

New York

• • • Fabricated steel awards this week included the following:

- 1085 Tons, Villisco, Iowa, bridge to Cunningham Reise Co.
- 540 Tons, St. Paul, Bridge 5514 for state of Minnesota, through Southern Construction Co., to Bethlehem Steel Co., Bethlehem.
- 440 Tons, Harmarville, Pa., geophysics laboratory building for Gulf Oil Co., through George H. Seaman, Pittsburgh, to Pittsburgh Bridge & Iron Co., Rochester, Pa.
- 285 Tons, Clallam County, Wash., bridges over Sol Duc River, PSH No. 9, through Paul Jarvis, Inc., to Poole, McGonigle & Dick.
- 240 Tons, Jefferson County, Fairbury, Neb., Bridge F459-1, to American Bridge Co., Pittsburgh.
- 220 Tons, Multnomah County, Ore., viaduct, Sandy River bridge, Columbia River highway, through General Construction Co., to Poole, McGonigle & Dick.
- 110 Tons, Burr Oak, Ind., Bridge 2929, through Indiana State Highway Dept. All bids rejected.
- 110 Tons, Vincennes, Ind., Bridge 2930, Indiana State Highway Dept., through Gradle Bros., Inc., to Central States Bridge Co.

• • • Fabricated steel inquiries this week included the following:

- 600 Tons, Philadelphia, store building, F. W. Woolworth Co. Bids in.
- 500 Tons, New Brunswick, N. J., Rutgers University, chemical building, Feb. 16.
- 450 Tons, Camden County, N. J., bridge, New Jersey Dept. of Highways. Bids rejected.
- 450 Tons, Bloomington, Neb., spillway bridge, U. S. Engineers. Bids close Jan. 27.
- 350 Tons, Washington, building for Pan American Union. Bids in.
- 300 Tons, Hulah, Okla., service bridge for Hulah Dam, U. S. Engineers.
- 150 Tons, Douglas County, Wis., Bridge WER-2, state of Wisconsin. Bids closed Jan. 20.
- 115 Tons, Price County, Wis., Bridge S0701-2, state of Wisconsin.
- 100 Tons, Roxborough, Pa., hospital addition, Jan. 22.

• • • Reinforcing bar awards this week included the following:

- 900 Tons, Grand Island, Neb., Veterans' Hospital, U. S. Engineers, through Lovering Construction Co., Minneapolis, and Carlson Construction Co., Sioux Falls, to Ceco Steel Products Co., Chicago.
- 500 Tons, Chicago, apartment building, through Peter Hamlin Construction Co., to O. J. Dean.
- 435 Tons, Chicago, Bond St. store, through Sumner Sollit Construction Co., to Ceco Steel Products Co., Chicago.
- 365 Tons, Milwaukee, warehouse for Pittsburgh Plate Glass, through Hunzinger Construction Co., to Ceco Steel Products Co., Chicago.
- 300 Tons, Springfield, Ill., power house for state of Illinois, to John Felmy Construction Co., Bloomington, Ill.
- 135 Tons, Multnomah County, Ore., viaduct, Sandy River bridge, Columbia River highway, through General Construction Co., to Mercer Steel Co.

way, through General Construction Co., to Mercer Steel Co.

125 Tons, Clallam County, Wash., bridges over Sol Duc River, PSH No. 9, through Paul Jarvis, Inc., to Bethlehem Pacific Coast Steel Corp., San Francisco.

• • • Reinforcing bar inquiries this week included the following:

- 530 Tons, Coachella, Calif., Coachella Valley flood protection, wasteway lining and structures, Bureau of Reclamation, Coachella, Spec. 2078. Bids to Feb. 11.
- 500 Tons, Omaha, Neb., Veterans' Hospital, through U. S. Engineers, Peter Kiewit Sons Co., low bidder.
- 340 Tons, Bald Hill, N. D., dam, U. S. Engineers. Bids closed Jan. 22.
- 300 Tons, East Peoria, Ill., Fond du Lac Dam, U. S. Engineers. Bids closed Jan. 19.

• • • Piling inquiries this week included the following:

- 340 Tons, East Peoria, Ill., Fond du Lac Dam, U. S. Engineers. Bids closed Jan. 19.

ODT to Outline Plan To Increase Monthly Car Output to 14,000

Washington

• • • Office of Defense Transportation is drawing up a 3-point agenda for presentation to steel and freight car officials on Jan. 27 and 28.

Encouraged by the success of the 10,000-car per month program, ODT plans to raise its sights on production targets, despite continuing tight supplies of car builders' materials. Specifically, ODT will:

(1) Ask car builders to increase monthly output from 10,000 cars to 14,000 units. Retirement of old

cars is continuing at a high rate, ODT says.

(2) Attempt to formalize the existing allocation program under the pattern being established by the new office of industry cooperation.

(3) Try to reach an agreement among suppliers and producers covering second quarter allocations of material. Biggest obstacle here: where's the extra steel coming from.

Senator Reed, R., Kan., meanwhile issued a subcommittee report summarizing action taken by the Senate Interstate Commerce Committee to lick the shortage. Mr. Reed criticized the Interstate Commerce Commission for its failure to exercise full powers in freight car distribution.

In another move toward formalized voluntary allocations, OIC has set Jan. 27 as the date for conferring with farm equipment producers. Secretary Harriman has stated that he will seek similar agreements among producers of oil refining equipment and other products soon thereafter.

Wheeling Orders Barges

Pittsburgh

• • • Wheeling Steel Co. has ordered 13 coal hopper barges from Dravo Corp. Each will be 210 ft long, 26 ft wide and 10 ft 8 in. deep. Since the end of the war, Wheeling has ordered 28 barges of this type from Dravo.

Coming Events

- Jan. 21-24 American Society of Civil Engineers, annual meeting, New York.
- Jan. 29-30 Wirebound Box Manufacturers Assn., annual meeting, Hollywood, Calif.
- Feb. 10-11 Pressed Metal Institute, annual meeting, Buffalo.
- Feb. 15-19 American Institute of Mining and Metallurgical Engineers, annual meeting, New York.
- Feb. 28, March 1-2 American Metallizing Contractors Assn., meeting, Cleveland.
- Mar. 3-5 Society of Automotive Engineers, national passenger car meeting, Detroit.
- Mar. 15-19 ASTE Industrial Exposition, Cleveland.
- Mar. 18-19 Magnesium Assn., annual meeting, New York.
- Apr. 5-8 Southern Machinery and Metals Exposition, Atlanta.
- Apr. 5-8 National Assn. of Corrosion Engineers, annual conference and exhibition, St. Louis.
- Apr. 7-9 American Society of Civil Engineers, meeting, Pittsburgh.
- Apr. 12-14 Openhearth Steel Committee and Coke Oven, Blast Furnace and Raw Materials Committee, AIME, annual conference, Pittsburgh.
- May 3-7 American Foundrymen's Assn., convention and show, Philadelphia.

RFC Urges Congress to Keep Longhorn Tin Smelter in Operation

Washington

• • • Strong representation is being made to Congress by the Reconstruction Finance Corp. urging that steps be taken now to assure continuation of operation of the \$8½ million government-owned Longhorn tin smelter at Texas City, Tex. The present operating contract with a Dutch firm expires on June 30.

At the same time, although its responsibility for the tin smelter plant extends until June 30, 1949, RFC would like to get out from under the operating job as soon as possible. Both proposals have been made in a special report to Congress now in the hands of the House Banking Committee.

Because of its strategic importance to national security, the RFC report emphasizes, the Longhorn works should be kept in operation for the next 5 to 10 years, "the estimated time required to accumulate an adequate supply of tin metal for the permanent stockpile."

In order to keep the smelter working, however, RFC says it will be necessary to do one of two things. Either continue government operations or turn the plant over to private industry and provide a subsidy to overcome the high cost of operation.

The first proposal is exactly what RFC does not wish to do. Under existing operation, this agency is authorized to operate the Longhorn facilities until June 30, 1949; next June, RFC will have to either renew the present contract with the Dutch firm, the Tin Processing Corp., or find a new operator for an additional year.

What RFC wants to do, however, is to get out from under completely; it much prefers to turn the matter over to private operators even though it admits the government would have to subsidize the operations to cover losses which would ensue under present conditions. The agency implies, however, that the subsidy cost would be relatively small.

Cost data have been submitted to Congress. Accumulated cost to the government through June 30,

Prefers Transferring Plant To Private Industry And Providing Subsidy

By KARL RANNELLS
Washington Bureau

1947, including construction, ore purchases and operating fees, amounted to about \$277 million. As of the same date, the government had received a return of approximately \$256 million, counting total metal sales and the inventories then worth about \$53 million. This left a net loss to the

government of about \$21 million.

Historically, the Longhorn facilities were built in 1941-42 by the Maatschappij subsidiary, the Tin Processing Corp., which had developed a process for high recovery of tin from low grade ores. Actual construction cost was \$8.2 million plus a later appropriation of \$2.6 million for a waste acid plant.

From 1942 until June 1947, the Dutch company operated the plant for the U. S. for an annual fee of \$150,000. This rate was increased to \$200,000 for the current fiscal year.

During the war, the smelter supplied more than 50 pct of all new tin used in the U. S.; in 1946, production went as high as 70 pct

50 YEARS AGO

THE IRON AGE, January 20, 1898

• "This is an era of low prices. Everything is making for the benefit of the customer and this condition is by no means confined to the iron industry. The consumer everywhere is benefiting at the expense of the producer, excepting in agriculture. If we could have a short crop of iron, prices would go up but there are no prospects of this and new fields of production seem to be opening up continually. The fact that there is no profit in the business is not due to lack of demand for iron. The trouble is that production increases even more rapidly than consumption."

• "We have had too much politics of all kinds and mostly of the bad kind. For the past four years the business man of the U. S., like Prometheus, has been chained to a rock while the politicians were the vultures. Questions of vital importance to the commerce of the country are tossed from one set of cheap politicians to another, without any of them being able to comprehend their true significance."

• "No one conversant with the history of the American iron trade and with its present development will deny that the center of cheapest production has been moving westward. However, it does not follow that the East, which once reigned supreme will be shorn of all power and will not continue to contribute an important part of the product of the country."

• "The last of three doors designed by Edward Pearce Carey for the Congressional Library in Washington has been completed and is on exhibition at the foundry of John Williams, 556 W. 27th St., New York City. The doors which were begun 2 years ago weigh 3 tons and are said to be among the best examples of artistic bronze work ever made in this country."

• "Due to a fire which occurred in our bindery last week, there was an unavoidable delay in the distribution of THE IRON AGE to many subscribers."

of domestic consumption. Production dropped in 1947, however, due to curtailed deliveries and transportation difficulties.

Although urging that the smelter be turned over to private interests, RFC recognizes the fact that unless incentive is offered the prospects are not good since it is a high cost operation.

"While costs might eventually be reduced through improved processing methods," RFC says, "a subsidy for the immediate future would be necessary . . . to operate at a profit."

Assistance could be extended in any one of three ways, the agency suggests — a direct grant per pound for tin metal produced, by direct reimbursement to cover operating losses, or by imposing an import tax on imported tin metal and at the same time admitting ores and concentrates free of duty.

RFC leans toward the latter proposal. It contends that it would not only encourage construction of other smelters but that it would have the effect of inducing foreign producers of concentrates to enter into long term contracts in the hope of getting more of the American trade.

Assuming an average domestic consumption of 75,000 tons of tin

Tin Imports, Smelter Production & Consumption of Tin Metal
(In Long Tons)

Year	Imports	Longhorn Smelter	U. S. Consumption
1942	26,753	15,695	56,288
1943	12,030	20,596	42,253
1944	13,338	30,609	59,156
1945	8,440	40,569	56,642
1946	6,716	43,469	58,347
1947	29,700	33,000	62,000
	96,977	183,938	338,686

Source: Reconstruction Finance Corp. Report to Congress.

For this 6-year period, it will be seen that consumption exceeded imports plus smelter production by roughly 60,000 tons. The deficit was supplied from private inventories and government stocks bought prior to 1942.

at 70¢, tin used in the United States would cost about \$117 annually were none produced domestically. This entire amount would be spent abroad. On the other hand, RFC holds, "If one-half of the needed tin is produced domestically, this amount would be reduced by not more than \$5 million, the cost of the smelting."

Should a tariff of 4¢ be imposed on this same consumption basis, it would cause American consumers to pay \$6.7 million additionally for their tin. With 50 pct of the total smelted domestically, the government would receive \$3,350,000, while domestic smelters

would benefit indirectly to the equivalent of the same amount.

As an additional argument against shutting down the Texas City plant, it is pointed out that because of national security the plant would presumably be retained in a standby condition. Maintenance costs for this are estimated at \$35,000 annually, which could otherwise be applied against estimated subsidy costs.

Furthermore, officials say, should the plant be closed down next year, it probably would have on hand at the time some 150 million gal of waste acid. Nearly 4 years would be required for the disposal plant to get rid of the acid in the surplus ponds.

At present, virtually all African production of concentrates is being shipped to European smelters. The United States has been obtaining from 18,000 to 20,000 tons from Bolivia. However, a trade pact between Bolivia and Argentina threatens to reduce this potential supply for the United States to about 10,000 tons.

A 1948 contract with the Dutch East Indies for 35 pct of production is calculated to provide an additional 13,000 tons (tin content). Siam and other miscellaneous sources are counted on to provide still another 3500 tons. Thus the supply of ores and concentrates now foreseen should enable the Texas City plant to run at a 25,000 to 30,000 ton rate.

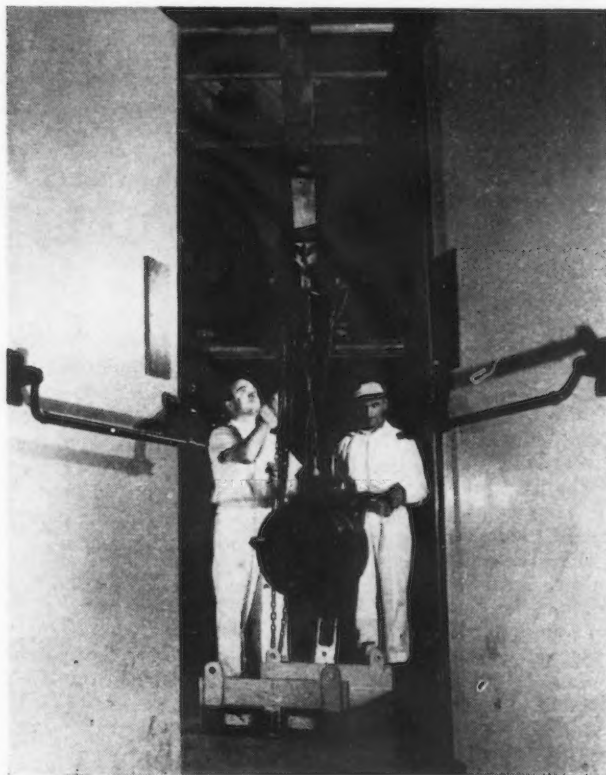
Jap Technical Journals Are Now Available From Carnegie Tech Library

Pittsburgh

•••Several hundred paper bound journals, representing a major portion of the issues of 12 Japanese scientific research publications which appeared during the war have been received at Carnegie Institute of Technology.

All of the material will be available on loan to scientists and students upon request. About half of the material is printed in Japanese, the remainder in English. Translation must be arranged for by the borrower.

While abstracts of Japanese research done since the beginning of the war have been made in Japan by American technical abstract journals, the publications have not been generally available until now.



HANDLE WITH CARE: The curtain has been partially lifted on Canada's \$20 million atomic energy plant at Chalk River, Ont. This photo shows a shielded container, or castle, which has been received from the pile building for the storage bins. The 350-lb castle contains a sample of radioactive iodine.

Canada Places Import Controls On Numerous Iron and Steel Items

Ottawa

... Canada, through schedule 3, of Finance Minister Abbott's Bill No. 3, has placed under import control the following items in the iron and steel group. Also under its capital goods import control the new order states, "Where the Governor-in-Council is of the opinion that any goods not included in schedules 1, 11, or 111, are being imported into Canada for use or consumption in substitution for any goods included in those schedules, respectively, the Governor-in-Council may by regulation prescribe that such goods shall be deemed to be included in schedules 1, 11, or 111, as the case may be, in which the goods for which the said goods are substituted, are included."

In schedule 3, where a tariff item of schedule "A" to the customs tariff is listed without being preceded by the word "ex" all goods included in the tariff item shall be deemed to be included in this schedule, and where a tariff item is listed and preceded by the word "ex" only the goods described thereafter are deemed to be included in this schedule, and the words and expressions in this schedule, have the same meaning as in the schedules to the customs tariff. The list dealing with iron steel, metals and their products follows:

378 Bars and rods, of iron or steel; billets, of iron or steel, weighing less than 60 lb. per lineal yd.:

- (a) Not further processed than hot rolled, n.o.p.
- (b) Not further processed than hammered or pressed, n.o.p.
- (c) Cold rolled, drawn, reeled, turned or ground, n.o.p.
- (d) Hot rolled, valued at not less than 4 cents per pound, n.o.p.

388 Iron or steel angles, beams, channels, columns, girders, joists, tees, zees and other shapes or sections, not punched, drilled or further manufactured than hot rolled, weighing not less than 35 lb per lineal yd, n.o.p.; piling of iron or steel, not punched or drilled, weighing not less than 35 lb per lineal yd, including interlocking sections, if any, used therewith, n.o.p.

388a Iron or steel shapes or sections, as hereunder defined, not punched, drilled or further manufactured than hot rolled, weighing not less than 35 lb per lineal yd, viz: I-beams, up to and including 6 in. in depth, but not to include H sections; channels, up to and including 7 in. in depth; angles, up to and including 6 x 6 in.; zees, up to and including 6 in. in depth of web.

388b Iron or steel angles, beams, channels, columns, girders, joists, tees, zees and other shapes or sections, not punched or drilled or further manufactured than

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- hot rolled, n.o.p.; piling of iron or steel, not punched or drilled, including interlocking sections, if any, used therewith, n.o.p.
- 388c Iron or steel beams or joists, not punched, drilled, or further manufactured than hot rolled, weighing less than 5½ lb per lineal yd for each in. in depth of web.
- 388d Iron or steel angles, beams, channels, columns, girders, joists, piling, tees, zeos, and other shapes or sections, punched, drilled, or further manufactured than hot rolled or cast, n.o.p.
- 388e Iron or steel side or centre sill sections, of all sizes not manufactured in Canada, weighing not less than 35 lb. per lineal yd, not punched, drilled or further manufactured, when imported by manufacturers of railway cars, for use in their own factories.
- 393 Tires, of steel, in the rough, not drilled or machined in any manner, for railway vehicles, including locomotives and tenders.
- ex 4091 Traction ditching machines (not being plows) and complete parts thereof for production use.
- ex 409m Internal combustion traction engines for other than farm purposes and complete parts thereof for production use.
- ex 412 Machinery, being presses for use in the printing of newspapers, of not less value by retail than \$1,500 each, of a class or kind not made in Canada; complete parts thereof for production use, not to include saws, knives, and motive power; mechanical deliveries or conveyors for use with newspaper printing presses.
- ex 412a Machinery and apparatus, n.o.p.; gun and mold apparatus for making press rollers; machines and apparatus for making electrotypes and stereotypes; engraving machines and apparatus, in-

- cluding photo-engraving apparatus, and other plate-making apparatus, used in the manufacture of printing plates of all kinds; machines and apparatus for graining metal plates; machines and apparatus for sensitizing, grinding or polishing metal plates; machines and apparatus including cameras and camera equipment, lens, prisms, camera and printing lamps, screens and vacuum frames for transferring by photographic processes, or direct, to plates or rolls for use in lithography, rotogravure and printing, shading apparatus; machines and apparatus for addressing and/or wrapping newspapers, magazines, periodicals, pamphlets and catalogues; machines and apparatus for embossing or stamping or producing embossed or engraved effects, book-binding, looping, stitching, sewing, gathering, inserting, bronzing, dusting, creasing scoring, cutting perforating, drilling, punching, slitting, rewinding, glueing, pasting, gumming, waxing, varnishing, carbon coating, patching, numbering, ruling, jogging, sheet piling, tying, bundling, tubemaking, metal mounting, eyeletting, staying or stripping, reinforcing and box-covering; complete parts for production use, not to include saws, knives and motive power; all the foregoing when for use exclusively by, and in their capacities as printers, lithographers, bookbinders, manufacturers of stereotypes, electrotypes and printing plates or rolls, paper converts, or by manufacturers of articles made from paper or cardboard.
- ex 412b Flat bed cylinder printing presses, to print sheets of a size 25 by 38 in. or larger; complete parts thereof for production use; machines designed to fold or sheet-feed paper or cardboard; complete parts thereof for production use.
- ex 412c Typesetting and typesetting ma-

- chines for use in printing offices; parts thereof for production use.
- ex 412d Offset presses; lithographic presses; printing presses and type-making accessories therefor, n.o.p.; complete parts of the foregoing for production use not to include saws, knives and motive power.
- ex 413 Machinery and apparatus, of a class or kind not made in Canada, parts thereof for production use, specially constructed for preparing, manufacturing, testing or finishing yarns, cordage, and fabrics made from textile fibres or from paper, imported for use exclusively by manufacturers and scholastic or charitable institutions in such processes only.
- ex 414 Complete parts of typewriters for production use.
- ex 414a Complete parts of dictating, transcribing and cylinder shaving machines for production use.
- ex 414c Bookkeeping, calculating and invoicing machines, and complete parts thereof for production use, and complete parts of adding machines for production use.
- ex 415 Complete parts of electric and hand vacuum cleaners for production use.
- ex 415b Complete parts for washing machines, domestic, for production use.
- ex 415c Complete parts for domestic clothes wringers for production use.
- ex 415d Sewing machines, other than domestic, with or without motive power incorporated therein; complete parts of sewing machines for production use.
- ex 420 Machinery of a class or kind not made in Canada, when imported by manufacturers of leather for use exclusively in the tanning of leather or the embossing of leather in their own factories, under regulations prescribed by the Minister, and complete parts thereof for production use.
- ex 422 Street or road rollers and complete parts thereof for production use.
- ex 422a Concrete road-paving machines, self-propelling, end loading type, with a capacity of 21 cu ft of wet concrete or more; concrete and asphalt road finishing machines; form graders, subgraders; combination excavating and transporting scraper units; concrete mixers, transit type; dump wagons or trailers, having a capacity of 10 cu yd or over, not self-propelled; back-filling machines and equipment, mounted on self-propelling wheels or crawling traction, semi- or full-revolving boom and scraper type; steam or air-driven pile hammers or extractors; well-points; truck turntables; all the foregoing of a class or kind, not made in Canada; complete parts thereof for production use.
- ex 422b Trench and ditch excavating machines, round wheel or vertical ladder boom, chain and bucket type, for digging vertical or sloping bank ditches; complete parts thereof for production use.
- ex 424 Fire engines and other fire extinguishing machines and chassis for same; complete parts of the foregoing for production use other than chassis parts.
- ex 425 Lawn mowers designed for use with motive power, whether or not containing the power unit; complete parts thereof for production use.
- ex 427a All machinery composed wholly or in part of iron or steel, n.o.p., valued at over \$200 per unit; complete parts thereof for production use.
- ex 427a All machinery composed wholly or in part of iron or steel, n.o.p., of a class or kind not made in Canada, valued at over \$200 per unit; complete parts of the foregoing for production use.
- 427e Automatic machines for making and packaging cigars and cigarettes, not to include tobacco-preparing machines.
- ex 427f Machines for the manufacture of veneers and plywoods, viz.—veneer clippers, veneer clipper knife jointers, veneer glue spreaders, veneer jointers, veneer lathes and veneer tapping machines; complete parts of all the foregoing for production use.
- ex 427h Motion picture projectors for use with film one and one eighth of an inch in width or over, electric rectifiers or

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generators designed for use with such motion picture projectors; arc lamps for motion picture work, motion picture or theatrical spot lights, light effect machines complete parts of all the foregoing for production use, not to include electric light bulbs, tubes or exciter lamps.

ex 423 Traction engines, n.o.p.; complete parts thereof for production use.

ex 428c Engines or boilers, n.o.p.; complete parts thereof for production use.

ex 428e Diesel and semi-Diesel engines, n.o.p.; complete parts thereof for production use.

ex 428f Air-cooled internal combustion engines of not greater than 1½ hp rating; complete parts thereof for production use.

434 Locomotives for use on railways, and chassis, tops, wheels and bodies for the same, n.o.p.

ex 434a Motor rail cars or units for use on railways, and chassis for same; complete parts of the foregoing for production use.

434b Steel wheels for use on railway rolling stock, viz:

(i) pressed steel.

(ii) n.o.p.

ex 435 Locomotive and motor cars for railways, of a class or kind not made in Canada, for use exclusively in mining, metallurgical or sawmill operations; complete parts thereof for production use; Diesel switching locomotives of a class or kind not made in Canada.

ex 438 Railway cars, n.o.p.; parts thereof for production use.

438a Automobiles and motor vehicles of all kinds, n.o.p.; electric trackless trolley buses, chassis for all the foregoing.

438b Bearings, clutch release; bearings, graphite; bearings, steel or bronze backed, with nonferrous metal lining; bushings, graphited or oil impregnated; ceramic insulator spark plug cores, not further manufactured than burned and glazed, printed or decorated or not, without fittings; compressors, air; commutator copper segments, commutator insulating end rings; tapered discs of hot rolled steel, with or without centre hole, for disc wheels; distributor rotors and cam assemblies; door bumper shoes; electric wiring terminals, sockets, fittings, connectors and parts thereof, not to include battery terminals; gaskets of any material except cork or felt, composite or not; ignition contact points; keys for shafting; auxiliary driving control kits, designed for attachment to motor vehicles to facilitate their operation by physically disabled persons, and parts thereof; lenses of glass for head, tail, dome, signal and cowl or parking lamps, and for light reflectors; lock washers; piston ring castings in the rough, with or without gates and fins removed; rails of lock seam section, corners, locks and catches, unplated ventilators and parts thereof, the foregoing being of metal other than aluminum, for the manufacture of window sashes for bus bodies; steel bolts, or studs, capped with stainless steel, switches for lamps, heaters and defrosters and parts thereof; vacuum control assemblies; vulcanized fibres in sheets, rods, strips and tubing; all of the foregoing when of a class or kind not made in Canada and for use in the manufacture or the repair of the goods enumerated in tariff items 424 and 438a, or for use in the manufacture of parts therefor.

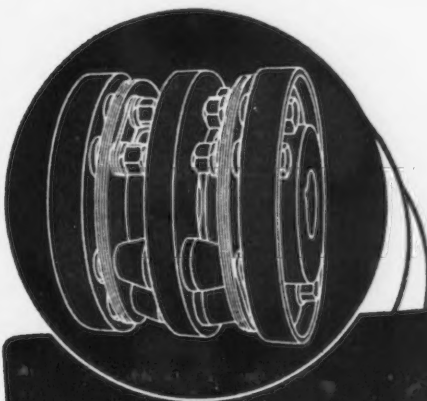
438c Ammeters; arm rests and wheel housing lining of indurated fibre, pressed to shape; axle housings, one piece welded, machined or not; carburetors and parts thereof; chassis frames and steel shapes for the manufacture thereof; cigar and cigarette lighters, whether in combination with a cigarette holder or not, including base, and parts thereof; control ventilator gear box; cylinder lock barrels, with or without sleeves and keys thereof; dash heat indicators and parts thereof; electric gear shift switches and parts thereof; engine speed governor units and parts thereof; fluid couplings, with or without drive plate assemblies, and parts thereof; front axle cross channel king pin support section assembly of steel, in the rough; fuel pumps, vacuum pumps and com-

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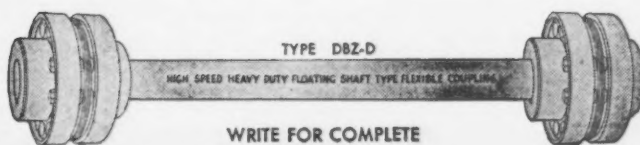
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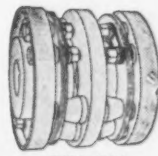
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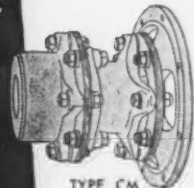
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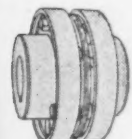
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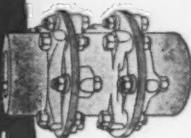
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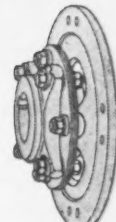
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TYPE ST



TYPE AM



TYPE SS

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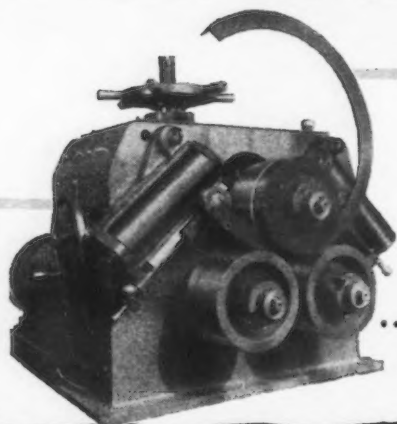
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PITTSBURGH, 23, PA.

NEWS OF INDUSTRY

binations thereof and parts thereof; gasoline gages and parts thereof; hinges and parts thereof, finished or not, for bodies; horns and parts thereof; instrument bezel assemblies and parts thereof; instrument board lamps; locks, electric ignition, steering gear, transmission, or combinations of such locks, and parts thereof; moldings of metal with nails set in position, lead filled or not; oil filters and parts thereof; oil gages and parts thereof; pipe lines of tubing, rigid or flexible, covered or not, with or without fittings, and tubing thereof, for oil, fuel, air, or liquid for actuating hydraulic brakes; purifiers for air, and parts thereof; purifiers for oil or gasoline, parts thereof and brackets and fittings thereof, radiator, hood and other grills, assembled or not, and parts thereof, but not polished nor plates, and not to include finish or decorative molding; radiator ornaments, and hood lift lock ornaments, unplated, and parts thereof; radiator shutter assemblies, automatic; radiator water gages; radiator shells and parts thereof, not plates nor metal finished in any degree; shackles, bearing spring, and parts thereof; speedometers and parts thereof; spring covers of metal and closing strips or shapes thereof; stampings, body, cowl, hood, fender and instrument board, or metal in the rough, trimmed or not, but not metal finished in any degree; starter switch assembly and parts thereof; steering wheels, rims and spiders thereof; sun visor blanks of gypsum weatherboard; thermostat and parts thereof; throttle, spark and choke assemblies, including buttons thereof, and parts thereof; tire clamping rings of steel, plated or not; universal joint ball assemblies; voltage control regulators; windshield wipers and parts thereof; all of the foregoing when of a class not made in Canada and for use in the manufacture or the repair of the goods enumerated in tariff items 424 and 438a or for use in the manufacture or parts thereof.

438d Front and rear axles; brakes, clutches; internal combustion engines; steering gears; magnetos; rims for pneumatic tires larger than 30 in. by 5 in.; transmission assemblies; hydraulic or fluid couplings and torque converters; drive shafts; universal joints; steel road wheels; and parts of the foregoing, when of a class or kind not made in Canada, and imported by manufacturers of the goods enumerated in tariff items 424 and 438a for use only in the manufacture of motor trucks, motor buses and electric trackless trolley buses, or for the manufacture of chassis for the same.

438e Parts, n.o.p. for automobiles, motor vehicles, electric trackless trolley buses or chassis enumerated in tariff items 438a and 424, not to include wireless receiving sets, die castings of zinc, electric storage batteries, parts of wood, tires and tubes or parts of which the component material of chief value is rubber:

- (1) Brake linings, and clutch facings whether or not including metallic wires or threads:
 - (a) when made from crude asbestos of Empire origin.
 - (b) when made from crude asbestos of non-Empire origin.
- (2) Automobile and motor vehicle engines, stripped, n.o.p. and complete parts thereof, n.o.p.
- (3) Parts, n.o.p. not electroplated, whether finished or not.

438f Hot rolled strip of iron or steel with rolled or mill edge, of a class or kind not made in Canada, when imported for use in the importer's own factory, in the manufacture of the goods enumerated in tariff items 424 and 438a, or in the manufacture of parts thereof.

ex 438g Motor cycles or side cars thereof; complete parts of the foregoing for production use.

438h Annular ball bearings and parts thereof, when imported for use only as original equipment in the manufacture of goods enumerated in tariff items 438a and 424, under regulations prescribed by the Minister.

438i Body bottom cross members and steel shapes for the manufacture thereof; bumpers, front and rear, and parts

thereof, including spring steel bumper plates; casket tables or platforms for hearses; destination and route sign assemblies, illuminated or not, and parts thereof; direction signals, illuminated or not; door and step mechanism, hand, vacuum or air operated, and parts thereof; door locks and catches and parts thereof; electric switches, buzzers, bells, push buttons, fuse assemblies and parts thereof; forward drive control conversion assemblies and parts thereof; lamps of all kinds, illuminating and indicating, including sockets, flanges, terminals, glassware, lenses and gaskets therefor, assembled or not, but not to include lamp bulbs; metal stampings, oiled and primed or not, and assemblies thereof; rubber fenders, seat operating mechanisms, ventilators, including motor driven fan type, and grills, and parts thereof; and window operating mechanisms; all of the foregoing when imported to be used only in the manufacture of motor truck bodies, motor bus bodies, electric trackless trolley bus bodies, motor ambulances and hearses.

438j Piston castings of any material, in the rough or semifinished.

ex 439b Cars, n.o.p. trucks, road or railway scrapers.

ex 440, ex 440a Vessels, dredges, scows, yachts, boats and other water borne craft, built outside of Canada, of any material, destined for use or service in Canadian waters, except pleasure boats of all kinds.

ex 4401 Aircraft, n.o.p.; complete parts thereof for production use, not including engines, under regulations prescribed by the Minister.

440M ex (i) Unfinished parts of aircraft, n.o.p., for production use, not including parts for production of aircraft engines.

(ii) Direct or inertia starters with or without related operating gear and parts thereof; generators; voltage control boxes; batteries; de-icing and anti-icing equipment and parts thereof, not including parts of rubber; vacuum pumps with related operating gear and parts thereof; landing and navigation lights; propellers; hydraulic jacks and pumps and parts thereof; aircraft wheels; aircraft brakes with related operating gear; aircraft tires and tubes; oil coolers; fuel pressure warning devices; exhaust gas analyzers; pressure fire extinguishers; primer pump; instruments excepting fuel contents gages; bolts, nuts, cocks, turnbuckles, clevis and pins, swaged wires and tie rods; bars, tubes, extrusions and forgings of aluminum, aluminum alloys and magnesium alloys; steel tubing; all of the foregoing when of types and sizes not made in Canada and imported by manufacturers of aircraft for use exclusively in the manufacture in their own factories of the goods enumerated in tariff item 4401, under such regulations as the Minister may prescribe.

440n Engines, when imported for use only in the equipment of aircraft.

440o ex (ii) Parts, finished or not, n.o.p., for the production of aircraft engines.

ex 440p Direct or inertia starters with or without related operating gear and parts thereof; generators; voltage control boxes; batteries; de-icing and anti-icing equipment and parts thereof, not including parts of rubber; vacuum pumps with related operating gear and parts thereof; landing and navigation lights, propellers; hydraulic jacks and pumps and parts thereof; aircraft wheels; aircraft brakes with related operating gear and parts thereof; aircraft tires and tubes; oil coolers; fuel pressure warning devices; exhaust gas analyzers; pressure fire extinguishers; primer pumps; instruments excepting fuel contents gages; bolts, nuts, cocks, turnbuckles, clevis and pins, swaged wires and tie rods, bars, tubes, extrusions and forgings of aluminum, aluminum alloys and magnesium alloys; steel tubing; all the foregoing when of types and sizes not made in Canada and imported for use exclusively in the manufacture of the goods enumerated in tariff item 4401 under such regulations as the Minister may prescribe.

ex 422d Materials, including all parts, wholly or in chief part of metal, of a class or kind not made in Canada, when

domination.

6. Redoubling, by management, of its efforts to increase production, to lower unit costs, and to pass on the benefits of such increased productivity to the public.

7. Encourage management

From
"Twelve Forward
Steps to Halt Inflation"
proposed by the National
Association of Manufacturers

Here, indeed, is an able, statesmanlike proposal . . .

the N.A.M.'s 12-point program; and Step 6 in particular is a statement of both valid duty and brilliant opportunity—a call not merely to plan wisely but to "do something about it!"

There's a good tool at hand—designed for the job, proved by its distinguished record for speeding production, breaking bottlenecks, cutting costs to a minimum: the Clark Method of material handling.

Practically every business that handles materials has many opportunities for rich savings that easily can be won by planned use of Clark machines.

Today, alert management in thousands of businesses is diligently seeking new ways to use Clark machines—

- recognizing each new application as an additional opportunity to speed production and to cut production cost; benefits of increased productivity that can instantly be passed along to the public.

Look into this better way — with its many extraordinary opportunities for big savings. Clark can help you—will bring to you, at no cost or obligation, all this company's unequalled experience in material handling. Write us.

CLARK GAS AND ELECTRIC POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS



CLARK EQUIPMENT COMPANY, TRACTOR DIVISION, BATTLE CREEK 51, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

imported by manufacturers of goods entitled to entry under tariff items 410g, 410i, 410n, 410o, 410p, 410q, 410u, 410w, 410z, 411, 411a, 411b, 428c, 428e and 447a, for use in the manufacture of such goods in their own factories, under such regulations as the Minister may prescribe.

ex 443 Parts for the production of apparatus designed for cooking or for heating buildings;

(1) For coal or wood (2) For gas
(3) For electricity (4) For oil
(5) n.o.p.

ex 443a Ovens, of a class or kind not made in Canada, for use in commercial bakeries; complete parts of the foregoing, for production use.

ex 445 Complete parts of electric light fixtures and appliances, n.o.p., for production use.

ex 445d Complete parts of electric wireless or radio apparatus, n.o.p., for production use.

ex 445f Electric dynamos or generators and transformers, n.o.p.; complete parts thereof for production use.

ex 445g Electric motors, n.o.p.; complete parts thereof for production use.

ex 445i Complete parts for the production of electric sad irons.

ex 445j Parts for the production of electric dry shaving machines for use in removing human hair.

ex 445k Electric apparatus, n.o.p., complete parts for production use, of a total invoice value exceeding \$25.

\$2 Million Expansion To Speed Transfer of Coal to Lake Boats

Cleveland

••• To speed the dumping of coal in Great Lakes vessels and the return of empty cars to the coal mines, Chesapeake & Ohio Railway Co. is spending nearly \$2 million in improvement of its Walbridge yard and Presque Isle docks at Toledo, Ohio.

Railway officials said the largest project in the program is the mechanization of the westbound hump and classification yard at Walbridge. This includes installation of 15 car retarders, 53 power-operated switches and 106 power and hand-operated skates for stopping cars not properly retarded.

As a part of this project, the hump is being moved 350 ft east of its present location to allow coal cars to roll to classification yard tracks on a longer grade.

Estimated to cost \$1,328,270, this project was begun May 1, 1947, and is scheduled for completion June 1, 1948.

At present, cars are shoved over the hump for classification at the rate of three per min. With installation of retarders, it is expected that this rate will rise to five cars per min. As a result, more lake coal can be classified at the hump than at present. Faster classification of coal will prevent delay in loading lake vessels.

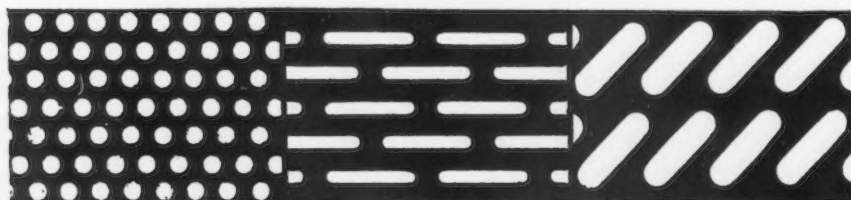
In 1947, almost 17 million tons of coal were handled at Walbridge for dumping at Presque Isle docks, compared with an average of about 11 million tons a year before the war.

Another project at Walbridge is the construction of two additional pull-in tracks in the eastbound yard, authorized by C & O directors in Dec. 1947, at estimated cost of \$84,500. This will bring the number of tracks in the eastbound yard to 19, and eliminate most delays to puller runs from Presque Isle docks and facilitate the movement of coal cars.

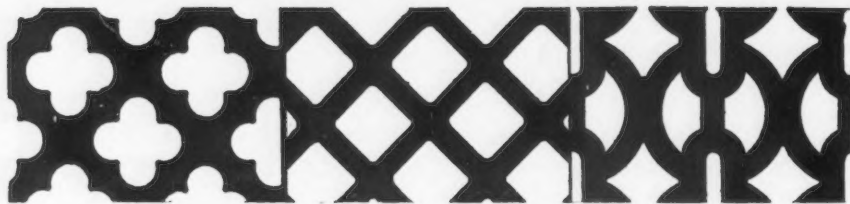
To better handle its increased ore business, the C & O is building three additional 50-car storage tracks at Presque Isle. Ranging in length from 1874 ft to 2070 ft, these tracks will be located just back of the ore unloading machine, and will be used for storing empty cars to be spotted for ore loading and assembling ore trains for Walbridge.

Ore loadings in 1947 exceeded 20,000 cars, more than double the number loaded at Presque Isle in 1946. Ore transferred from lake vessels into railroad cars at Presque Isle is assembled into trains of 75 to 110 cars and moved to Walbridge for further movement east.

Improvements in other C & O facilities at Toledo include a \$261,900 program for enlarging 10 stalls of the 18-stall roundhouse at Walbridge, installing a 300-ton sand storage and drying plant and rearranging tracks at the roundhouse; a \$31,500 project for installation of air lines and train testing equipment at Walbridge and Presque Isle; a \$42,000 project for installation of additional water supply facilities at Presque Isle; expenditure of \$49,200 for two buildings, including a yard office, to improve working facilities at Walbridge, and a \$27,500 building for yardmasters and crews at Presque Isle.



For whatever purpose you need perforated metal



Hendrick will fabricate it to your specifications * * * from any commercially rolled metal * * * in any gauge * * * with any shape or size of openings. Extensive plant facilities, an unsur-

passed stock of dies and tools, and more than 70 years' experience in perforating metals, are at your service.

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Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

HENDRICK

Manufacturing Company

37 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

Weekly Gallup Polls

(CONTINUED FROM PAGE 107)

was clearly demonstrated. The price squeeze evidently has helped change the majority outlook; at any rate the argument most respondents give for tax reduction is that high living costs make it necessary for individuals to have relief.

Politically speaking, the desire for tax reduction is proportionately greater among Republicans than Democrats. Of the former, 57 pct want taxes lowered, while only 46 pct of Democrats vote that way.

The public debt today is around \$256 billion, or \$3 billion less than a year ago. The peak was reached at the end of February last year when it hit \$278 billion. Last year individuals paid \$18.7 billion in taxes to the federal government and corporations \$31.2 billion.

Under President Truman's proposal individual taxes on 1948 incomes would be cut \$40 across the board plus a \$40 credit for each dependent. The resulting reduction in government revenues of \$3.2 billion, he said, might be raised by higher levies on corporations.

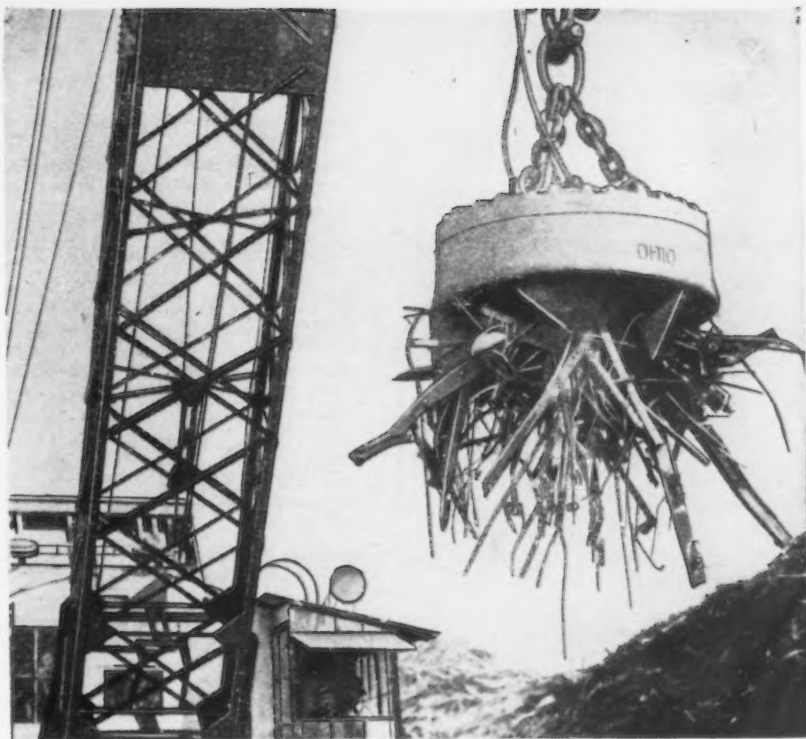
Harold Knutson, Republican congressman from Minnesota and chairman of the House Ways and Means Committee, has introduced a bill to reduce taxes by \$5.6 billion.

Dr. C. W. Balke Honored For Tantalum Research

New York

• • • Dr. Clarence W. Balke, emeritus director of research of the Fansteel Metallurgical Corp., North Chicago, Ill., has been presented with the Perkin Medal of the American Section of the Society of Chemical Industry for his research leading to the development of processes for the production and commercial utilization of tantalum and columbium.

Dr. Balke was responsible for the first practical process for large scale production of tantalum, which was accomplished only 25 years ago.



Hands off!

One lift, one swing, one drop.

Magnetic materials handling moves scrap *directly* to where you want it—in magnet-minutes instead of manhours.

The magnet you invest in determines *how much faster* scrap can be moved. Just as there is a difference in the physical strength of men, there is also a difference in the electrical strength of magnets.

A small 20 inch Ohio Magnet, however, easily lifts more than 200 pounds of high grade scrap. Our larger 65 inch magnet attracts and holds more than 6200 pounds of the same grade of scrap.

Ohio Electric makes 14 different sizes of circular magnets. Fitting the right size magnet to your specific needs doesn't take much time—but *it does take experience.*

Some of our customers frequently say they prefer Ohio Magnets because Ohio chain

ears have square holes for chain pins to eliminate friction and prolong life. Others especially like the Ohio Armored Weatherproof Connector with insulated iron shell and bayonet joint. It withstands smashing blows and saves time when making or breaking connections.

Find out *now* how much you can reduce scrap handling costs. Write to Ohio: *for 25 years a leader in magnetic materials handling.*



*also a leading name in
the small motor field*

THE OHIO ELECTRIC MFG. CO.

5908 MAURICE AVE. • CLEVELAND 4, OHIO

Buyer's Guide

(CONTINUED FROM PAGE 72)

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Sturgis Products Co., Sturgis, Mich.

Burnishing and Polishing Barrels

Allied Industrial Products Co., 620 North Michigan Ave., Chicago 11.

Beam-Knodel Co., 195 Lafayette St., New York 12.

Botwinik Bros. of Mass., Inc., 5 Sherman St., Worcester 1, Mass.

Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18.

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Hartford Steel Ball Co., New Park Ave. & Jefferson St., Hartford 6, Conn.

Puritan Mfg. Co., Waterbury, Conn.

Ransome Machinery Co. Sub. of Worthington Pump & Machinery Corp., Dunellen, N. J.

Sommers Bros. Mfg. Co., 3439-41-43 N. Broadway, St. Louis 7.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Burnishing and Polishing Compounds and Chips

Allied Industrial Products Co., 620 North Michigan Ave., Chicago 11.

Beam-Knodel Co., 195 Lafayette St., New York 12.

General Abrasive Co., Inc., Niagara Falls, N. Y.

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Hartford Steel Ball Co., New Park Ave. & Jefferson St., Hartford 6, Conn.

Magnus Chemical Co., South Ave., Garwood, N. J.

Parsons Engineering Corp., 2549 E. 79th St., Cleveland 4.

Puritan Mfg. Co., Waterbury, Conn.

Smith, F. L., & Co., 11 W. 42nd St., New York 18.

Sommers Bros. Mfg. Co., 3439-41-43 N. Broadway, St. Louis 7.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Turco Products, Inc., P. O. Box 2649 Terminal Annex, Los Angeles 54.

Wyandotte Chemicals Corp., Wyandotte, Mich.

Burring Compounds (See Buffing, Polishing Compositions)

Bushings, Bearings, and Bearing Metal (See also Specific Types)

Ampeco Metal, Inc., Milwaukee 4.

Cadman, A. W., Mfg. Co., 2800 Smallman St., Pittsburgh 22.

Dodge Mfg. Corp., Mishawaka, Ind.

Federal-Mogul Corp., Shoemaker Ave., Detroit 13.

Federated Metals Div., American Smelting & Refining Co., 120 Broadway, New York 5.

Johnson Bronze Co., 505 S. Mill St., New Castle, Pa.

National Bearing Div., American Brake Shoe Co., 5000 Manchester Ave., St. Louis 10.

Saginaw Bearing Co., Saginaw, Mich.

Shenango-Penn Mold Co., Dover, Ohio.

Bushings, Bronze

Atlas Brass Foundry, Inc., Santa Fe Ave., Los Angeles 21.

Bearium Metals Corp., 258 State St., Rochester.

Chase Brass & Copper Co., Waterbury, Conn.

Cleveland Graphite Bronze Co., St. Clair Ave., Cleveland.

Dixie Bronze Co., Inc., Birmingham.

Johnson Bronze Co., 505 S. Mill St., New Castle, Pa.

Mocassin Bushing Co., Burr Bldg., Chattanooga, Tenn.

Mueller Brass Co., Port Huron, Mich.

Shenango-Penn Mold Co., Dover, Ohio.

Bushings, Self Lubricating

Bearium Metals Corp., 258 State St., Rochester, N. Y.

Bound Brook Oil-Less Bearing Co., Lincoln Blvd., Bound Brook, N. J.

Chrysler Corp., Amplex Div., Detroit.

Gatke Corp., Wacker Dr., Chicago.

Bushings, Thread Insert

Aircraft Screw Products Co., Inc., 47-23 35th St., Long Island City 1, N. Y.

Aluminum Plant Offered By Detroit WAA Office

Washington

••• A completely-equipped, government-owned aluminum extrusion plant in Adrian, Mich., is being offered for sale or lease by War Assets Administration through its regional office in Detroit, Mich.

The plant, available for immediate occupancy, was designed to produce approximately 36 million lbs of aluminum extrusions per year. It has been under lease to the Bohn Aluminum and Brass Co.

The property, occupying 73 acres of rail and highway frontage in Adrian, consists of a main factory building, boiler house, warehouse, garage and auxiliary structures, with machine tools, equipment and fixtures, all in operating condition.

Both plant and equipment are ready for production and are being offered by WAA for sale or lease as a whole for their original purpose or other use, subject in either event to provisions of the National Security Clause requiring their availability for aluminum extrusions in event of national emergency.



Social Security for Your Machine Tools

Worn machine tools cut down your production, cause lost time and lower profits. Give them the advantage of Botwinik's complete engineering and mechanical facilities for rebuilding, repairing and remodeling. Botwinik's quality rebuilding gives new life and greater efficiency to weary machine tools at tremendous savings.

Write, wire or phone Botwinik (Worcester 6-5175) for a complete story.



Canadian Steel Production and Shipments

Toronto

• • • Canadian production of primary iron and steel shapes for the month of October totalled 265,600 net tons as compared with 256,972 tons in September and with 154,193 tons in October 1946. Output for October included 252,404 tons of carbon steel shapes and 13,196 tons of alloy steel shapes. In the production figures for October are included 70,984 tons shipped to producers own plants or to other plants within the primary industry for further processing.

Shipments of primary iron and steel shapes in October amounted to 203,988 tons of which 191,287 tons were carbon shapes and 12,701 tons alloy shapes; in September shipments totaling 184,182 tons included 175,536 tons of carbon and 8,646 tons of alloy shapes, and for October 1946 shipments amounted to 147,096 tons including 138,725 tons of carbon and 8,371 tons of alloy steel shapes. The above figures which show iron and steel shapes for sale do not include deliveries for further processing.

For the 10 months ending with October, production of primary iron and steel shapes totalled 2,617,224 net tons, while shipments for sale amounted to 1,968,788 tons and deliveries for producers interchange amounted to 658,709 tons. For the corresponding period of last year production totalled 1,885,495 tons and shipments for sale 1,549,783 tons and producers' interchange 346,852 tons.

The following table shows production and shipments for sale of primary iron and steel shapes for the month of October in net tons:

October 1947	Carbon Steel		Alloy Steel	
	Made	Shipped	Made	Shipped
Billets, etc. for forging	7,842	5,609	1,130	990
Other semi-finished shapes, not for re-rolling by makers	25,021	2,554	525	
Structural shapes and piling	17,911	16,629		
Plates	16,246	16,793		
Rails	26,738	24,529		
Tie plates and track material:				
Splice bars		18		
Tie plates	31	256		
Spikes	691	570		
Tool steel	230	238	422	315
Concrete reinforcing bars	7,172	7,651		
Hot rolled bars for cold finishing	2,025			
Other hot rolled bars	34,488	33,735	9,081	9,468
Pipes and tubes	12,773	12,487		
Wire rods	25,396	15,523		13
Hot rolled black sheets	23,004	18,352		
Cold reduced black sheets	3,809	3,809		
Galvanized sheets	7,618	8,055		
Steel castings—Made by ingot makers	2,231	2,479	195	157
—Made in other foundries	5,092	4,932	1,674	1,591
All other shapes, including tin plate, tin mill black plate, cold finished bars and strips, etc.	34,086	17,068	169	167
TOTAL	252,404	191,287	13,196	12,701

Producers' shipments of primary iron and steel shapes sub-divided according to principal consuming industries for the month of October in net tons, follow:

Industry	Carbon Steel	Alloy Steel
Automotive industries	8,702	7,189
Agricultural, including farm machinery	6,009	320
Building construction	25,781	87
Containers industry	11,913	3
Machinery and tools	13,599	645
Merchant trade products	19,869	50
Mining, lumbering, etc.	4,980	579
National defense	42	1
Pressing, forming and stamping	12,292	89
Public works and utilities	1,513	90
Railway operating	21,104	175
Railway cars and locomotives	18,883	225
Shipbuilding	4,061	23
Miscellaneous and unclassified	1,157	168
Wholesalers and warehouses	30,091	202
Direct export (a) to British Empire	2,454	940
(b) to Other Countries	8,837	1,915
TOTAL SHIPPED FOR SALE	191,287	12,701
Producers' Interchange	70,459	525

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Accurately
WITH SAFETY



The positive acting friction brake on the Reading Multiple Gear Chain Hoist makes possible accurate positioning of the work or load with complete safety.

The maple inserts in the brake wheel hold the load tightly against the friction disc till the load is to be moved. Lowering requires only that the operating chain be pulled in the down direction. The load lowers without slipping or speeding up.

Each Reading Multiple Gear Chain Hoist is so well built that it has a guaranteed overload capacity of 25% in every size from ¼ ton to 25 tons.

Investigate Reading Hoists for your materials handling problems. Consult your distributor or write us direct.

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HOISTS**

MACHINE TOOLS

... News and Market Activities

Outlook Good for January as New Firm Orders Are Reported

• • • An influx of new firm orders was reported this week by segments of the machine tool industry where price increases are promised or pending, and indications are that January will be a good month.

Trade observers believe that price increases usually drive in some business, and it may be significant that only those producers whose prices are going up reported the bulk of the new business.

Customers generally are showing lots of interest, but the inclination to spend is lacking, according to company representatives, many of whom have the highest volume of quotations pending since the end of the war, and fewest orders to show for their efforts.

Despite the fact that some segments of the industry are starting out the new year in good shape, there are indications that a break in demand in all machine tool lines is in the offing. While Detroit users, particularly the automobile industry, are buying at the present time, it is possible that the industry as a whole may not spend much money for machine tools in 1948.

Nor does railroad buying look very promising, according to trade sources. At the same time, the volume of contract or jobbing work in many machine tool shops is growing steadily, which would hardly seem to indicate hope of an immediate change to near capacity operations.

Bulk of the recent price increases or "adjustments" have been in the 5 to 12½ pct range, apparently depending on how the particular unit was showing up cost-wise. Recent increases in pig iron and the high scrap prices were a big factor in the decision in many cases.

Disposal of government-owned surplus machine tools has moved into its final phase when War Assets Administration instructed its field offices to begin competi-

Believe Promised or Pending Price Increases Bring In New Business

o o o

tive bid offerings at various locations as soon as tools are screened for the national stockpile and are adequately offered at fixed prices.

No new large offerings of surplus machine tools have been made by WAA since Oct. 1, 1947, although some sales programmed before that date have been continued. Halt on new offerings was called to allow the Joint Army and Navy Machine Tool Committee to screen and tag tools wanted for the industrial reserve.

JANMAT selections from all storage locations will not be complete for some months, but under WAA's instructions, sales will be conducted immediately after completion of tagging at each of the warehouses.

After JANMAT selections at a specific location, a 45-day inspection period will be provided to accommodate all classes of prospective buyers. Priority purchasers may buy individual items at fixed prices during the first 15 days of the inspection period. During the last 30 days of the period, unsold tools will be offered at fixed prices to all buyers and, at the same time, bids will be accepted, but awards on bids will not be made until expiration of the 45-day period.

Any residual stocks after fixed price and competitive bid sales, where quantities are large enough, will be offered in carload lots to all classes of bidders.

As of Dec. 1, 1947, about \$1 billion worth of surplus machine tools out of acquisitions of about \$1,320,000,000 had been sold to commercial users, donated to schools and institutions for training purposes, or returned to the national stockpile by WAA.

In Detroit, important segments of the industry report a substantial and balanced demand for new equipment. A large Chrysler-Dodge tooling program, it is reported, is now well into its final details and inquiries are out for a substantial volume of new equipment for Kaiser-Frazer's Willow Run plant. Ford, it is reported, has been planning important purchases of equipment that will be used to modernize the WAA machines to be used in its Mound Road operations. Much of this program is at present only in the inquiry stage.

Delivery has recently been made at Flint of a 44-ton rotary Fellows gear shaper that will be used to cut the central gear in the planetary unit of Buick's new "Dynaflow" transmission.

Some sources indicate that important tooling commitments are expected shortly by Reo and by Nash, who are planning to produce an automatic transmission for its 1949 models.

In addition to substantial activity by motor car builders, a good volume of business is being placed by small plants and shops, it is reported. This is always regarded as a favorable indication by experienced suppliers in the Detroit machine tool market.

In the East, some dealers report January sales volume to be small but others find a marked improvement of orders and inquiries in the last week. Most South American countries are all but closed to exporters due to the lack of dollar exchange but some firms have been doing a reasonable volume of business with Cuba in recent months. Commenting on the continuing news of new sales and mergers of machine tool manufacturers, some dealers here have expressed the belief that additional developments along that line will take place as the opportunity to get out at a profit is presented to more and more old-established firms.

Speed cutting-off Service



Crucible Steel Started Something

11 years ago Crucible Steel Company's Chicago warehouse started something when they installed their first MARVEL Saws to give fast service on "cut to size" orders. Today, 9 Crucible Steel Company warehouses are equipped with MARVEL Saws, can deliver on short notice accurately cut-off lengths or slices from even the largest bars and billets, or literally thousands of identical pieces automatically cut-off at terrific speed from single or nested bars.

The above picture of the new cutting-off department in Chicago shows two No. 18 MARVEL Giant Hydraulic Saws (capacity 18" x 18") and two No. 9A MARVEL Automatic Production Saws (capacity 10" x 10").

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People" 5700 Bloomingdale Ave. Chicago 39, U. S. A.

MARVEL *Metal Cutting* **SAWS**
Better Machines—Better Blades

There are MARVEL-equipped Crucible Steel Company warehouses in:

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ST. LOUIS
CLEVELAND
DETROIT
DENVER
NEW YORK
PHILADELPHIA
BOSTON
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NONFERROUS METALS

... News and Market Activities

Copper

... Producers have sold out most of their February domestic copper by this time but some February foreign copper is still available. Neither wire mills nor brass mills have been able to obtain their full requirements of February copper, producers report. Major producers are adhering to the price of 21.50¢ for foreign and domestic sales, and the tonnage of export copper sold at 21.75¢ continues relatively small. Wage agreements with Chilean mine workers come to an end during February and there is the expectation that higher wage rates may be demanded. So far, producers have had no indication what demands may be presented. Domestic wage agreements are up for renewal in April.

Producers are discussing the effect of the new export license regulations which go into effect in March. It has been indicated that the price at which exports are to be made will be given consideration in granting licenses and the lower priced export shipments of identical commodities will be given preference. In some quarters there is the feeling that these regulations when put into effect will shut off export sales of copper at prices above 21.50¢.

Deliveries of copper to domestic customers in December rose to 113,446 tons, an increase of 7214 tons above November deliveries and the highest month since last June, according to figures reported by the Copper Institute. Refined copper production in the United States reached 108,816 tons in December, an increase of 11,291 tons over November, and was the highest refined production month of the year. Crude primary copper production in De-

cember was 73,382 tons, an increase of 8464 tons over the previous month. Domestic refined stocks at the end of December were 74,832 tons. Copper statistics from outside the United States were not yet available for December.

Lead

... Consumers of lead are reported to be unable to obtain more than a portion of their current requirements as indicated to producers in attempting to place orders. There is some hope that consumers may benefit by the annual decline in the battery industry's requirements which normally begins in March. However, it may be that the battery industry will attempt to build a stock of lead during this period in view of the current critical shortage of the metal. Established market prices were unchanged.

Zinc

... Predictions of higher market prices in zinc have so far failed to materialize largely because sales of Joplin concentrates have been made on the basis of the average monthly price. Sellers have wanted to secure the benefits of the higher prices once they are established and so far no seller has held out for a price higher than the \$70.35 per ton figure established more than a month ago. Producers report that the production of western zinc operations has been increasing in recent months as there is a better supply of labor available. Operations in southeastern Missouri are reported to be diverting a greater proportion of their activity to development work and production

is declining somewhat in consequence.

Scrap Prices Higher

New York

... Dealers report that all grades of copper and brass scrap are being bought at higher prices by smelters and refineries. Price increases range from 1/2¢ to 2¢ per lb on some grades. Significant price increases have been made in practically all scrap metals, including lead, zinc, nickel alloys and composition metals.

Raise Aluminum Ingots

New York

... A major producer of aluminum ingots announced price increases of 1/4¢ to 3/4¢ per lb last week. This increase brings the price of secondary ingots above the market prices for virgin ingots. The price increase has been made necessary by the higher prices being paid for scrap by primary producers and by some of the chemical plants. Primary aluminum production has been curtailed by a shortage of water power, and this has thrown an additional load on aluminum smelter production. Aluminum scrap, still coming out in satisfactory volume, is being bought up to take care of this additional demand.

British Raise Tin Prices

London

... The United Kingdom price of tin charged to domestic consumers has been increased by £9 per ton to £519. At the current exchange rate of \$4.03 1/4, the new price is \$2092.87 per ton or 93.4¢ per lb. The new higher price is stated officially to result from the United States-Bolivian agreement. The price paid by the British Ministry of Supply for Nigerian tin has been raised to £485.10.0d per ton (\$1957.78) or 87.4¢ per lb. There was no equivalent advance for Malayan producers.

Nonferrous Metals Prices

Cents per pound

	Jan. 14	Jan. 15	Jan. 16	Jan. 17	Jan. 19	Jan. 20
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

NONFERROUS METALS PRICES

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point, freight allowed	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be	
dollars per lb contained Be	\$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be	\$40.00
Cadmium, de'd	\$1.75
Cobalt, 97-99% (per lb)	\$1.65 to \$1.72
Copper electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz	\$35.00
Indium, 99.8%, dollars per troy oz	\$2.25
Iridium, dollars per troy oz	\$80 to \$90
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	\$80 to \$82
Nickel, electro, f.o.b. New York	36.56¢
Palladium, dollars per troy oz	\$24.00
Platinum, dollars per troy oz	\$66 to \$69
Silver, New York, cents per oz	74.625
Tin, Grade A, New York	94.00
Zinc, East St. Louis	10.50
Zinc, New York	11.10
Zirconium copper, 6 pct Zr, per lb contained Zr	\$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	19.75-20.50
No. 120	19.25-20.00
No. 123	18.75-19.50
80-10-10 ingot	
No. 305	25.50
No. 315	23.00
88-10-2 ingot	
No. 210	31.00
No. 215	29.00
No. 245	23.75
Yellow ingot	
No. 405	15.75-17.00
Manganese Bronze	
No. 421	19.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	16.50-17.25
0.60 copper, max.	16.50-17.00
Piston alloys (No. 122 type)	14.00-16.00
No. 12 aluminum (No. 2 grade)	15.50-16.00
108 alloy	16.00-16.25
195 alloy	14.00-16.50
ANS-679	16.50
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1-95 pct-95½ pct	15.25-16.00
Grade 2-92 pct-95 pct	14.00-15.00
Grade 3-90 pct-92 pct	13.50-14.50
Grade 4-85 pct-90 pct	13.25-14.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37½
Electrodeposited	32.34
Rolled, oval, straight, delivered	32.59
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	33½
Zinc, cast, 99.99	18½
Nickel 99 pct plus, frt. allowed	
Cast	51
Rolled, depolarized	52
Silver 999 fine	
Rolled, 1000 oz lots per troy oz	67½

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drub	44.50
Copper sulfate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt. allowed	14.50
Silver cyanide, 100 oz lots, per oz	54.00
Sodium cyanide, 96 pct domestic, 200 lb drums	16.00
Zinc cyanide, 100 lb drums	35.50
Zinc sulfate, 89 pct, granules, bbls, frt. allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall; 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness; 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 21S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. Rod: 2S, 3S, 1¼ to 2½ in. diam rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. Round Wire: drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢, 10,000 lb base. B & S gage 00-1; 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSA, ¼ in., 54¢-56¢; 0.188 in. 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-81.01; 22, 81.22-81.31; 24, 81.62-81.75. Specification grade higher.

Round Rod: M. diam. in. ¼ to ¾, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M. size across flats, in. ¼ to ¾, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M. form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M. wall thickness, outside diam. in. 0.049 to 0.057, ¼ to 5/16, 81.21; 5/16 to ¾, 81.12; ¾ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ¾, 81¢; 0.065 to 0.082, ¾ to 1, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets		41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks		31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, 1cl.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

Cents per pound, freight prepaid on 200 lb.

	Extruded Shapes	Rods	Sheets
Copper	33.53		33.68
Copper, hot-rolled		30.03	
Copper, drawn		31.03	
Low brass	34.04*	31.07	31.38
Yellow brass	32.39*	29.32	29.63
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct	53.25*	52.25	52.00
Muntz metal	29.17	27.92	32.36
Everdur, Hercules, Olympic, etc.	37.07	35.57	38.14
Nickel silver, 5 pct	41.20	40.28	38.67
Architectural bronze	27.94		
*Seamless tubing.			

Scrap Metals

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Yellow brass rod turnings	14¼¢
Leaded yellow brass turnings	14¼¢
Loose yellow brass trimmings	15¼¢

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire	17 — 17½
No. 2 heavy copper and wire	16 — 16½
Light copper	14½ — 15
Auto radiators (unsweated)	10¼ — 10¾
No. 1 composition	12¾ — 13¼
No. 1 composition turnings	12¼ — 12¾
Clean red car boxes	10½ — 11
Cocks and faucets	10½ — 10¾
Mixed heavy yellow brass	8 — 8½
Old rolled brass	8½ — 9
Brass pipe	10 — 10½
New soft brass clippings	12 — 12½
Brass rod ends	10½ — 11
No. 1 brass rod turnings	19 — 19½

Aluminum

Alum. pistons with struts	4½ — 5
Aluminum crankcases	6½ — 7
2S aluminum clippings	9 — 9½
Old sheet & utensils	7 — 7½
Mixed borings and turnings	12 — 12½
Misc. cast aluminum	6½ — 7
Dural clips (21S)	6 — 6½

Zinc

New zinc clippings	6½ — 7
Old zinc	5 — 5½
Zinc routings	2½ — 3
Old die cast scrap	2½ — 3

Nickel and Monel

Pure nickel clippings	16 — 17
Clean nickel turnings	12½ — 13
Nickel anodes	16 — 17
Nickel rod ends	16 — 17
New Monel clippings	12 — 13
Clean Monel turnings	7 — 8
Old sheet Monel	10 — 10½
Old Monel castings	7½ — 8
Inconel clippings	8 — 8½
Nickel silver clippings, mixed	8 — 8½
Nickel silver turnings, mixed	6½ — 7

Lead

Soft scrap lead	12 — 12½
Battery plates (dry)	7 — 7½

Magnesium Alloys

Segregated solids	7½ — 8
Castings	4½ — 5½

Miscellaneous

Block tin	75 — 77
No. 1 pewter	60 — 62
No. 1 auto babbitt	45 — 47
Mixed common babbitt	13½ — 14
Solder joints	16½ — 17
Siphon tops	45 — 47
Small foundry type	16 — 16½
Monotype	15 — 15½
Lino. and stereotype	14 — 14½
Electrotype	11½ — 12
New type shell cuttings	14½ — 15
Clean hand picked type shells	6½ — 7
Lino and stereo dross	6½ — 7
Electro dross	4½ — 5

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.	
Pull lead sheets	18.20
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

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UNITED STATES STEEL

Market Marks Time During Convention

New York

... Any big news of the week was not in actual scrap transactions as the markets mostly marked time while steam was blown off at the Institute's Chicago convention. Whether or not the convention hatched any brainstorms remains to be seen, but expectations this year at least called for the gathering to be more than just a party.

A major spread in heavy melting grades appeared in the Philadelphia market when one consumer took a large tonnage of No. 1 at a price of \$46 delivered. This development reflects the tight pig iron market in that area and represents an effort by the one mill to obtain scrap of higher quality than is now generally delivered as heavy melting scrap. The development of the spread speaks for itself in regard to grading practices of the past few months.

Formula prices are still being held. The major consumer in Pittsburgh allegedly wants over 10,000 tons of openhearth material at the formula figure—and seems to be getting light shipments on the order—but the extent of brokers' response so far would indicate that they're humoring rather than seriously dealing with the mill.

Many more weeks of such little scrap activity cannot pass without a showdown on the formula prices. There have been no indications that mills are getting shipments sufficient to maintain their stockpiles. On the other hand, brokers continue to avoid speculative purchases, so the real test of the formula line is apparently still not quite at hand.

PITTSBURGH — Any trading concerning this district was confined to the Chicago convention early this week. But a few substantial advances were chalked up in the list. Railroads followed the formula price by advancing their heavy melting grades 50¢ on allocations to mills through brokers. Rails, both short and scrap, sold up \$2 during the week and some turnings were also stronger. Cupola cast was \$1.50 higher for the week and the railroad specialties moved up \$1. Malleable advanced \$6. The major consumer here placed orders with a number of brokers for open-

hearth scrap at the \$40.50 formula price. Quantity was reported to be over 10,000 tons. There are no reports of brokers falling all over each other to fill this order but material is being shipped against it.

CHICAGO—What was moving in openhearth scrap items last week finally evened up at \$39.50 across the board. Previous sales at 50¢ above this appear to have been stopped although overgrading may still exist with some consumers. Late indications are that the mills are holding the formula line, but the possibility of a single consumer being forced to jump out of line still exists. Turning and boring prices remain somewhat different than the standard formula spreads, and a spread in the price range of railroad heavy melting scrap became apparent last week. Under pressure by the mills, the roads split their tonnages on this item with some going to the mills at the formula price and the rest being sold at free market quotations. Many foundries, however, will still pay the higher price for all of this type of scrap they can get.

CLEVELAND — Aside from nominal shipments of customer scrap at formula prices, there is little activity here or in the Valley. Foundry grades are strong and moving freely at high prices. Mill inventories are lower than a week ago, and some consumers will soon have to make the big decision, whether to break the formula or take off openhearth. Some brokers and dealers are refusing to take anything but open orders, and everybody is afraid of being caught in the middle. Some sources in the trade believe it is only a matter of time until the formula is broken all along the line, with the diehards going along.

DETROIT—Openhearth prices are holding at the formula level here although there is admittedly a considerable volume of scrap that would normally go to large mills which is being purchased by foundries and ingot producers. Most of this tonnage it is admitted is going at over-the-formula prices, although a much larger tonnage all earmarked is being sold at formula. The turnings market continues strong and reports from dealers are mixed, with some sources indicating an easing of cast prices coincident with the withdrawal from the market of four of the largest buyers in the Detroit territory. Isolated sales of cast grades at prices of \$70 and over continue to be reported, however.

PHILADELPHIA — Heavy melting grades sold at higher prices in this district last week and a price spread developed between No. 1 and other heavy melting grades when one mill bought an appreciable tonnage of that grade at \$46 delivered. Other heavy melting grades were sold to consumers at \$42.50. Turnings and cast grades were also sold at

higher prices. Low phos and railroad grades also sold at higher prices.

BOSTON — Big consumers still insist \$31.40 is all they will pay for heavy melting steel. Yards will not take business on that basis. And that's that. Small Pennsylvania consumers have bought carlots at \$32; some are bidding up to \$35. Frozen yard piles and car shortages limit small fry business, however, and they do not make a market. Cast is snapped up as fast as available, generally at \$50 f.o.b. yard and at up to \$55 truck-delivered nearby.

NEW YORK—A continuation of the lull which set in last week was encouraged by rather adverse weather and the fact that major dealers were out of their offices attending the Chicago clambake. Formula prices were still holding, and cast items continued to show comparative strength.

BUFFALO—A leading local consumer claimed reduced operations to nurse a "precariously low" stock pile were necessary. Only three openhearths were shut down, but the mill reported further curtailment would be necessary unless shipments pick up. Dealers were quick to deny responsibility asserting that they had taken open orders at the \$39.75 formula price and were shipping all they could obtain at that figure. The shipments admittedly were confined to No. 2 heavy melting and bundles and were extremely light. As a result, No. 1 heavy melting broke away from the rest of the list in price. Adding to the strength of the No. 1 grade was the report that railroad heavy melting had sold to a consumer at \$46.50.

BIRMINGHAM — Extremely cold weather for the deep South has hampered yard operations and shipments. A shortage of gas sharply curtailed foundry operations with resultant reduced consumption of scrap by those users.

ST. LOUIS—Steel mills in this area continue to hold the price line. Dealers are reportedly paying from \$1.50 to \$2.50 more than the mills offer and for shipment to other markets. Foundry grades continue to advance.

TORONTO—With offerings of scrap iron and steel from domestic sources tapering off, Canadian consumers are turning more extensively to foreign sources for their scrap supply and importations are being maintained at a high rate. With only small tonnages coming in from the United States, larger quantities are being imported from various sources, including Australia and Hong Kong. While actual cost figures are not available, it is understood that imported scrap is laid down at prices well above prevailing Canadian ceiling levels for steel grades. Local dealers state that only small lots are appearing in their yards, mostly from industrial plants. No scrap is appearing on the market from rural communities, most of which are shut off as a result of severe weather conditions and heavy snow.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$40.50
RR. hvy. melting	\$41.00 to 41.50
No. 2 hvy. melting	40.50
RR. scrap rails	53.00 to 54.00
Rails 2 ft and under	57.00 to 58.00
No. 1 comp'd bundles	40.50
Hand bldd. new shts.	40.50
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	35.00 to 35.50
Shoveling turn.	38.00 to 38.50
Mixed bor. and turn.	37.00 to 37.50
Cast iron borings	37.00 to 37.50
No. 1 cupola cast.	56.50 to 57.00
Hvy. breakable cast.	43.00 to 44.00
Malleable	65.00 to 67.00
RR. knuck. and coup.	53.50 to 54.50
RR. coil springs	53.50 to 54.50
RR. leaf springs	53.50 to 54.50
Roller steel wheels	53.50 to 54.50
Low phos.	47.00 to 48.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$39.50
No. 2 hvy. melting	39.50
No. 1 bundles	39.50
No. 2 dealers' bundles	39.50
Bundled mach. shop turn.	39.50
Galv. bundles	37.50
Mach. shop turn.	34.50 to 35.00
Short shov. turn.	36.50 to 38.00
Cast iron borings	35.50 to 36.00
Mix. borings & turn.	34.50 to 35.00
Low phos. hvy. forge	50.00 to 55.00
Low phos. plates	45.00 to 47.00
No. 1 RR. hvy. melt.	41.75 to 49.00
Rerolling rails	63.00 to 64.00
Miscellaneous rails	57.00 to 58.00
Angles & splice bars	60.00 to 61.00
Locomotive tires, cut	57.00 to 58.00
Cut bolster & side frames	52.00 to 54.00
Standard stl. car axles	62.00 to 64.00
No. 3 steel wheels	56.00 to 57.00
Couplers & knuckles	60.00 to 61.00
Rails 2 ft and under	64.00 to 65.00
Malleable	75.00 to 76.00
No. 1 mach. cast.	69.00 to 70.00
No. 1 agricul. cast.	62.00 to 63.00
Heavy breakable cast.	55.00 to 60.00
RR. grate bars	60.00 to 62.00
Cast iron brake shoes	60.00 to 61.00
Cast iron carwheels	58.00 to 60.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$39.50 to \$40.00
No. 2 hvy. melting	39.50 to 40.00
No. 1 bundles	39.50 to 40.00
No. 2 bundles	39.50 to 40.00
Mach. shop turn.	33.50 to 34.00
Shoveling turn.	33.50 to 36.00
Cast iron borings	32.50 to 33.00
Mixed bor. & turn.	34.50 to 35.00
Low phos. plate	52.50 to 54.00
No. 1 cupola cast	61.00 to 63.00
Hvy. breakable cast	55.00 to 58.00
Rails 18 in. & under	61.00 to 65.00
Rails random length	55.00 to 59.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. melting	\$33.00 to \$35.00
No. 2 hvy. melting	31.40 to 32.00
Nos. 1 and 2 bundles	31.40 to 32.00
Busheling	31.40 to 32.00
Shoveling turn.	32.00 to 32.50
Machine shop turn.	28.50 to 29.50
Mixed bor. & turn.	29.50 to 30.00
C'n cast. chem. bor.	34.00
No. 1 machinery cast.	50.00 to 55.00
No. 2 machinery cast.	50.00 to 55.00
Heavy breakable cast.	47.00 to 50.00
Stove plate	45.00 to 50.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	\$35.00 to \$35.50
No. 2 hvy. melting	35.00 to 35.50
No. 1 bundles	35.00 to 35.50
New busheling	35.00 to 35.50
Flashings	35.00 to 35.50
Mach. shop turn.	30.00 to 30.50
Shoveling turn.	31.00 to 31.50
Cast iron borings	31.00 to 31.50
Mixed bor. & turn.	31.00 to 31.50
Low phos. plate	41.00 to 42.00
No. 1 cupola cast	60.00 to 65.00
Heavy breakable cast.	53.00 to 58.00
Stove plate	55.00 to 57.00
Automotive cast	60.00 to 65.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$45.00 to \$46.00
No. 2 hvy. melting	41.50 to 42.50
No. 1 bundles	41.50 to 42.50
No. 2 bundles	41.50 to 42.50
Mach. shop turn.	35.00 to 35.50
Shoveling turn.	36.00 to 36.50
Mixed bor. & turn.	35.00 to 35.50
Clean cast chemical bor.	40.00 to 42.00
No. 1 machinery cast.	58.00 to 60.00
No. 1 mixed yard cast.	56.00 to 57.00
Hvy. breakable cast.	54.00 to 55.00
Clean auto cast	56.00 to 57.00
Hvy. axle forge turn.	43.50 to 44.50
Low phos. plate	47.50 to 48.50
Low phos. punchings	47.50 to 48.50
Low phos. bundles	46.50 to 47.50
RR. steel wheels	51.00 to 52.00
RR. coil springs	51.00 to 52.00
RR. malleable	70.00 to 75.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$41.00 to \$42.00
No. 2 hvy. melting	38.00 to 39.00
Bundled sheets	38.00 to 39.00
Mach. shop turn.	33.00 to 34.00
Locomotive tires, uncut	50.00 to 52.00
Mis. std. sec. rails	54.00 to 55.00
Rerolling rails	54.00 to 55.00
Steel angle bars	57.00 to 58.00
Rails 3 ft and under	60.00 to 61.00
RR. steel springs	52.00 to 53.00
Steel car axles	55.00 to 56.00
Grate bars	56.00 to 57.00
Brake shoes	55.00 to 56.00
Malleable	71.00 to 72.00
Cast iron car wheels	56.00 to 57.00
No. 1 machinery cast.	69.00 to 70.00
Hvy. breakable cast	55.00 to 56.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$37.50 to \$38.50
No. 2 hvy. melting	37.50 to 38.50
No. 2 bundles	37.50 to 38.50
No. 1 busheling	37.50 to 38.50
Long turnings	25.00 to 26.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	26.00 to 27.00
Bar crops and plate	38.00 to 38.50
Structural and plate	38.00 to 38.50
No. 1 cupola cast.	60.00 to 63.00
Stove plate	55.00 to 58.00
No. 1 RR. hvy. melt.	37.50 to 38.50
Steel axles	38.00 to 39.00
Scrap rails	44.00 to 46.00
Rerolling rails	52.00 to 54.00
Angles & splice bars	47.50 to 50.00
Rails 3 ft. & under	52.00 to 56.00
Cast iron carwheels	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$40.00 to \$40.50
No. 2 hvy. melting	40.00 to 40.50
Mach. shop turn.	35.00 to 35.50
Short shov. turn.	36.00 to 36.50
Cast iron borings	36.00 to 36.50
Low phos.	47.50 to 48.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	\$33.50 to \$34.50
No. 2 hvy. melting	33.50 to 34.50
No. 2 bundles	33.50 to 34.50
Comp. galv. bundles	32.00 to 33.00
Mach. shop turn.	30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Shoveling turn.	30.00 to 31.00
No. 1 cupola cast.	50.00 to 51.00
Hvy. breakable cast.	50.00 to 51.00
Charging box cast.	50.00 to 51.00
Stove plate	50.00 to 51.00
Clean auto cast	50.00 to 51.00
Unstrp. Motor blks.	47.50 to 48.00
C'n chem. cast bor.	33.50 to 34.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$42.00 to \$46.00
No. 2 hvy. melting	39.75 to 41.00
No. 1 bundles	39.75 to 41.00
No. 2 bundles	39.75 to 41.00
No. 1 busheling	42.00 to 43.00
Mach. shop turn.	34.00 to 35.00
Shoveling turn.	36.00 to 37.00
Cast iron borings	31.50 to 32.50
Mixed bor. & turn.	31.50 to 32.50
Mixed cupola cast	53.00 to 55.00
Charging box cast.	48.00 to 50.00
Stove plate	52.00 to 54.00
Clean auto cast.	58.00 to 60.00
RR. malleable	70.00 to 75.00
Small indl. malleable	47.00 to 48.00
Low phos. plate	46.00 to 49.00
Scrap rails	49.00 to 50.00
Rails 3 ft & under	52.00 to 54.00
RR. steel wheels	48.00 to 50.00
Cast iron carwheels	48.00 to 50.00
RR. coil & leaf spgs.	48.00 to 50.00
RR. knuckles & coup	48.00 to 50.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$39.50 to \$40.00
No. 2 hvy. melting	39.50 to 40.00
No. 1 bundles	39.50 to 40.00
No. 1 busheling	39.50 to 40.00
Drop forge flashings	39.50 to 40.00
Mach. shop turn.	34.50 to 35.00
Shoveling turn.	36.50 to 37.00
Steel axle turn.	39.50 to 40.00
Cast iron borings	35.50 to 36.00
Mixed bor. & turn.	34.50 to 35.00
Low phos.	44.50 to 45.00
No. 1 machinery cast.	60.00 to 65.00
Malleable	70.00 to 72.00
RR. cast	63.00 to 65.00
Railroad grate bars	57.50 to 58.00
Stove plate	57.50 to 58.00
RR. hvy. melting	40.00 to 40.50
Rails 3 ft & under	61.00 to 63.00
Rails 18 in. & under	61.00 to 63.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	\$25.00
No. 2 hvy. melting	25.00
No. 2 bales	25.00

Per gross ton delivered to consumer:

No. 3 bales	\$19.50
Mach. shop turn.	16.00
Elec. furn. 1 ft und.	\$32.00 to 34.00
No. 1 cupola cast.	32.00 to 33.00
RR. hvy. melting	26.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$25.50
No. 2 hvy. melting	25.50
No. 1 bales	25.50
No. 2 bales	25.50
No. 3 bales	19.50
Mach. shop turn.	17.50
No. 1 cupola cast.	\$36.00 to 40.00
RR. hvy. melting	26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	\$25.50 to \$26.50
Elec. furn. 1 ft and und.	27.50 to 30.00
No. 1 cupola cast.	27.50
RR. hvy. melting	25.00 to 26.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point.

Heavy melting	\$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact, prep'd	21.00*
Bushelings, new fact, unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast	36.00 to 40.00

*Ceiling Price.

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-rolled Steel:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(cents per pound)				
Hot-rolled sheets	2.80	2.80	2.80	2.50
Cold-rolled sheets	3.55	3.55	3.55	3.20
Galvanized sheets (10 ga.)	3.95	3.95	3.95	3.55
Hot-rolled strip	2.80	2.80	2.80	2.50
Cold-rolled strip	3.55	3.55	3.55	3.20
Plates	2.95	2.95	2.95	2.65
Plates wrought iron	6.85	6.85	6.85	5.95
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.30

Tin and Terneplate:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(dollars per base box)				
Tinplate (1.50 lb) cokes	\$6.80	\$6.80	\$5.75	\$5.75
Tinplate, electro (0.50 lb)	6.00	6.00	5.05	5.05
Special coated mfg. ternes	5.90	5.90	4.90	4.90

Bars and Shapes:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(cents per pound)				
Merchant bars	2.90	2.90	2.90	2.60
Cold-finished bars	3.55	3.55	3.55	3.20
Alloy bars	3.30	3.30	3.30	3.05
Structural shapes	2.80	2.80	2.80	2.50
Stainless bars (No. 302)	26.00	26.00	26.00	25.97
Wrought iron bars	7.15	7.15	7.15	6.15

Wire and Wire Products:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(cents per pound)				
Bright wire	3.55	3.55	3.55	3.30
Wire nails	4.75	4.75	4.25	3.75

Rails:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(dollars per 100 lb)				
Heavy rails	\$2.75	\$2.75	\$2.75	\$2.50
Light rails	3.10	3.10	3.10	2.85

Semifinished Steel:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(dollars per gross ton)				
Rerolling billets	\$45.00	\$45.00	\$45.00	\$42.00
Sheet bars				50.00
Slabs, rerolling	45.00	45.00	45.00	42.00
Forging Billets	55.00	55.00	55.00	50.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	61.00

Wire Rods and Skelp:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(cents per pound)				
Wire rods	2.80	2.80	2.80	2.55
Skelp	2.60	2.60	2.60	2.35

Pig Iron:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(per gross ton)				
No. 2, foundry, Phila.	\$44.61	\$44.61	\$40.97	\$32.43
No. 2, Valley furnace	39.50	39.50	36.50	30.50
No. 2, Southern Cin'ti.	43.28	43.28	40.24	31.75
No. 2, Birmingham	37.38	37.38	34.88	26.88
No. 2, foundry, Chicago†	39.00	39.00	36.00	30.50
Basic del'd Philadelphia	44.11	44.11	40.47	31.93
Basic, Valley furnace	39.00	39.00	36.00	30.00
Malleable, Chicago†	39.50	39.50*	36.50	30.50
Malleable, Valley	39.50	39.50	36.50	30.50
Charcoal, Chicago	62.46	62.46	56.04	42.99
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is \$1 per ton.

‡ For carlots at seaboard.

* Revised.

Scrap:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(per gross ton)				
Heavy melt'g steel, P'gh.	\$40.50	\$40.50	\$40.00	\$32.25
Heavy melt'g steel, Phila.	45.50	41.50	40.50	31.00
Heavy melt'g steel, Ch'go	39.50	39.75	38.75	29.75
No. 1, hy. comp. sheet, Det.	35.25	35.25	34.75	27.00
Low phos. Young'n.	47.75	47.75	47.25	34.25
No. 1, cast, Pittsburgh	56.75	55.00	54.50	40.38
No. 1, cast, Philadelphia	59.00	58.00	55.50	43.00
No. 1, cast, Chicago	69.50	69.50	63.50	44.25

Coke, Connellsville:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(per net ton at oven)				
Furnace coke, prompt	\$12.50	\$12.50	\$12.50	\$8.75
Foundry coke, prompt	14.00	14.00	14.00	8.50

Nonferrous Metals:	Jan. 20, 1948	Jan. 13, 1948	Dec. 23, 1947	Jan. 21, 1947
(cents per pound to large buyers)				
Copper, electro. Conn.	21.50	21.50	21.50	19.50
Copper, Lake Conn.	21.625	21.625	21.625	19.625
Tin, Grade A, New York	94.00	94.00	94.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	12.80
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	36.56	36.56	37.67	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.25

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

Composite Prices . .

FINISHED STEEL

Jan. 20, 1948	3.18935¢ per lb.
One week ago	3.18925¢ per lb.
One month ago	3.18925¢ per lb.
One year ago	2.87255¢ per lb.

HIGH	LOW
1948	3.18925¢ Jan. 13
1947	3.18925¢ Aug. 12
1946	2.83599¢ Dec. 31
1945	2.44104¢ Oct. 2
1944	2.30837¢ Sept. 5
1943	2.29176¢
1942	2.28249¢
1941	2.43078¢
1940	2.30467¢ Jan. 2
1939	2.35367¢ Jan. 3
1938	2.58414¢ Jan. 4
1937	2.58414¢ Mar. 9
1936	2.32263¢ Dec. 28
1935	2.07642¢ Oct. 1
1934	2.15367¢ Apr. 24
1933	1.95578¢ Oct. 3
1932	1.89196¢ July 5
1931	1.99626¢ Jan. 13
1930	2.25488¢ Jan. 7
1929	2.31773¢ May 28

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

PIG IRON

.....\$40.08 per gross ton
.....\$40.08 per gross ton
.....\$37.06 per gross ton
.....\$30.14 per gross ton

HIGH	LOW
\$40.08 Jan. 13	\$39.58 Jan. 6
37.98 Dec. 30	30.14 Jan. 7
30.14 Dec. 10	25.37 Jan. 1
25.37 Oct. 23	23.61 Jan. 2
\$23.61	\$23.61
23.61	23.61
23.61	23.61
\$23.61 Mar. 20	\$23.45 Jan. 2
23.45 Dec. 23	22.61 Jan. 2
22.61 Sept. 19	20.61 Sept. 12
23.25 June 21	19.61 July 6
23.25 Mar. 9	20.25 Feb. 16
19.74 Nov. 24	18.73 Aug. 11
18.84 Nov. 5	17.83 May 14
17.90 May 1	16.90 Jan. 27
16.90 Dec. 5	13.56 Jan. 3
14.81 Jan. 5	13.56 Dec. 6
15.90 Jan. 6	14.79 Dec. 15
18.21 Jan. 7	15.90 Dec. 16
18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

SCRAP STEEL

.....\$41.83 per gross ton
.....\$40.58 per gross ton
.....\$39.75 per gross ton
.....\$31.00 per gross ton

HIGH	LOW
\$41.83 Jan. 20	\$40.00 Jan. 6
42.58 Oct. 28	29.50 May 20
31.17 Dec. 24	19.17 Jan. 1
19.17 Jan. 2	18.92 May 22
19.17 Jan. 11	15.76 Oct. 24
\$19.17	\$19.17
19.17	19.17
\$22.00 Jan. 7	\$19.17 Apr. 10
21.83 Dec. 30	16.04 Apr. 9
22.50 Oct. 3	14.08 May 16
15.00 Nov. 22	11.00 June 7
21.92 Mar. 30	12.67 June 9
17.75 Dec. 21	12.67 June 8
13.42 Dec. 10	10.33 Apr. 29
13.00 Mar. 13	9.50 Sept. 25
12.25 Aug. 8	6.75 Jan. 3
8.50 Jan. 12	6.43 July 5
11.33 Jan. 6	8.50 Dec. 29
15.00 Feb. 18	11.25 Dec. 9
17.58 Jan. 29	14.08 Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Hollowware enameling, gages 29 to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) to 0.035 to 0.075 in. thick by 3/4 to 3 1/2 in. wide. (16) Delivered Los Angeles; add 1/2¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases. Some producers charge (18) \$2 more. (19) \$1 more. Some producers charge (20) 0.05¢ less.

Basing Points	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	San Franc- isco, Los Angeles, Seattle	DELIVERED TO			
												Detroit	New York	Phila- delphia	
INGOTS															
Carbon, rerolling															
Carbon, forging	\$46.00														
Alloy	\$56.00														
											(Canton = \$56.00)				
BILLETS, BLOOMS, SLABS															
Carbon, rerolling ¹⁷	\$45.00 ¹⁸	\$45.00 ¹⁸	\$45.00 ¹⁸	\$47.00	\$45.00 ¹⁸	\$45.00 ¹⁸							\$48.20 ¹⁸		
Carbon, forging billets	\$55.00	\$55.00	\$55.00	\$55.00	\$55.00	\$55.00							\$58.20		
Alloy	\$66.00	\$66.00				\$66.00							\$69.20		
											(Bethlehem, Massillon, Canton = \$66.00)				
SHEET BARS															
											Subject to negotiation				
PIPE SKELP	2.60¢ ¹⁹						2.60¢ ¹⁹								
WIRE RODS	2.80¢ ¹⁹	2.80¢ ¹⁹		2.80¢ ¹⁹	2.85¢								3.52¢ ¹³		
							(Worcester = 2.90¢ ¹⁹)								
SHEETS															
Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢			(Ashland, Ky. = 2.80¢)	3.54¢ ¹⁶	2.96¢	3.148¢	3.040¢
Cold-rolled ¹	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.71¢	4.00¢	4.016¢
Galvanized (10 gage)	3.95¢	3.95¢	3.95¢		3.95¢		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢ ¹⁶		4.298¢	4.190¢
Enameling (12 gage)	3.95¢ ²⁰	3.95¢ ²⁰	3.95¢ ²⁰	3.95¢			3.95¢		4.05¢	3.95¢			4.11¢ ²⁰	4.466¢	4.406¢
Long ternes ² (10 gage)	4.05¢		3.85¢											4.566¢	4.506¢
STRIP															
Hot-rolled ³	2.80¢	2.80¢	2.80¢	2.80¢ ¹⁵	2.80¢		2.80¢					3.60¢ ¹⁶	2.96¢	3.316¢	3.256¢
Cold-rolled ⁴	3.55¢	3.65¢	3.65¢	3.55¢			3.55¢				(Worcester = 3.75¢)		3.71¢	4.066¢	4.006¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.616¢	
TINPLATE															
Cokes, 1.50 lb ⁵ , base box	\$6.80	\$6.80	\$6.80		\$6.90			\$6.90	\$6.90		(Warren, Ohio = \$6.80)		\$7.248	\$7.140	
Electro, box	0.25 lb 0.50 lb 0.75 lb														

PRICES

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 448
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation		Subject to negotiation			
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	Subject to negotiation		Subject to negotiation			
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation		Subject to negotiation			
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt, Beth.	Subject to negotiation		Subject to negotiation			
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Wire, Rat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg	32.46	30.30	23.80	24.34	34.82	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	28.75
Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	82¢
18	4	1	—	5	\$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢
High-carbon-chromium*					47¢
Oil hardening manganese*					26¢
Special carbon*					24¢
Extra carbon*					20¢
Regular carbon*					17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.50¢
Armature	4.80¢
Electrical	5.30¢
Motor	6.05¢
Dynamo	6.75¢
Transformer 72	7.25¢
Transformer 65	7.95¢
Transformer 58	8.65¢
Transformer 52	9.45¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	\$2.75
Angle splice bars, 100 lb	3.85
(F.o.b. basing points)	
Light rails (from billets)	\$3.10

Base per lb

Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.65¢
Tie plates, Pittsburg, Calif.	3.80¢
Track bolts	7.00¢
Track bolts, heat treated, to rail-roads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, St. Louis, Kansas City, Minnequa, Colo.; Birmingham; tie plates alone—Steelton, Pa., Buffalo, Pa.; cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

20x14 in. 20x28 in.	
8-lb coating I.C.	\$7.05 \$14.10

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washing-ton, Coatesville, Fa.	*24.00	*22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	...
Inconel-clad		
10 pct, f.o.b. Coatesville.	30.00	...
Monel-clad		
10 pct, f.o.b. Coatesville.	24.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	...	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham, Duluth

	Base per 100 lb	Delivered San Francisco
Standard & coated nails	\$4.75†	\$5.33
Galvanized nails††	4.75†	5.03
Cut nails, carloads, Pitts-burgh base	5.80*	....

† 30¢ additional at Worcester. †† Plus \$2.50 to \$3.00 per 100 lb galvanizing extra. * Less 20¢ to jobbers.

	Base per 100 lb	
Annealed fence wire	\$4.20†	\$5.21
Annealed galv. fence wire	4.65†	5.66

† 10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column 100 lb	
Woven wire fence*	100	114
Fence posts, carloads	105††	...
Single loop bale ties	99	115
Galvanized barbed wire**	113	121
Twisted barbless wire	113	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. †† Pitts-burgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	Hi Steel	Mayari R	Otis-cology	Yoloy	NAX High Tensile
Producer	Repub-lic	Carnegie-Illinois, Republic	Repub-lic	Alan Wood	Inland	Bethle-hem	Jones & Laughlin	Youngs-town Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30
Galvanized	5.85	5.85	5.85	5.85	5.85	6.00	6.00	6.00	6.00
Strip									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30†
Shapes		4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Beams		4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Bars									
Hot-rolled	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45
Bar shapes		4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PRICES

PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh and Lorain, steel butt weld and seamless. Others f.o.b. Pittsburgh only. Base price, \$200.00 per net ton

Standard, threaded & coupled

Steel, butt weld	Black	Galv.
1/2-in.	50 1/2	34 1/2
3/4-in.	53 1/2	38 1/2
1-in.	56	41 1/2
1 1/4-in.	56 1/2	42
1 1/2-in.	57	42 1/2
2-in.	57 1/2	43
2 1/2 and 3-in.	58	43 1/2
Wrought Iron, butt weld		
1/2-in.	+ 7	+29
3/4-in.	2 1/2	+19
1 and 1 1/4-in.	8	+11
1 1/2-in.	13 1/2	+ 7 1/2
2-in.	14	+ 7

Steel, lap weld		
2-in.	49	34
2 1/2 and 3-in.	52	37
3 1/2 to 6-in.	54	39
Steel, seamless		
2-in.	48	33
2 1/2 and 3-in.	51	36
3 1/2 to 6-in.	53	38

Wrought Iron, lap weld		
2-in.	5 1/2	+14 1/2
2 1/2 to 3 1/2-in.	8	+10 1/2
4-in.	12	+ 5
4 1/2 to 8-in.	10	+ 6 1/2

Extra Strong, plain ends

Steel, butt weld		
1/2-in.	49 1/2	35
3/4-in.	53 1/2	39
1-in.	55 1/2	42
1 1/4-in.	56	42 1/2
1 1/2-in.	56 1/2	43
2-in.	57	43 1/2
2 1/2 and 3-in.	57 1/2	44
Wrought Iron, butt weld		
1/2-in.	+ 2 1/2	+23
3/4-in.	3 1/2	+17
1 to 2-in.	13	+ 7

Steel, lap weld		
2-in.	48	34
2 1/2 and 3-in.	52	38
3 1/2 to 6-in.	55 1/2	41 1/2
Steel, seamless		
2-in.	47	33
2 1/2 and 3-in.	51	37
3 1/2 and 6-in.	54 1/2	40 1/2

Wrought Iron, lap weld		
2-in.	8 1/2	+11
2 1/2 to 4-in.	17 1/2	+ 1/2
4 1/2 to 6-in.	13	+ 5

Basing discounts for standard pipe are for threads and couplings. For threads only, butt weld, lap weld and seamless pipe, one point higher discount (lower price) applies. For plain ends, butt weld, lap weld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lap weld and seamless 3 1/2-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all butt weld. On butt weld and lap weld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots, cut length 4 to 2 1/2 ft. inclusive.

OD	Gage	Hot Rolled	Cold Drawn	Electric Weld Hot Rolled	Electric Weld Cold Drawn
2	13	\$16.67	\$19.99	\$16.17	\$19.39
2 1/2	12	22.42	26.87	21.75	26.06
3	12	24.93	29.90	24.18	29.00
3 1/2	11	31.17	37.39	30.23	36.27
4	10	38.69	46.38	37.53	44.99

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	\$91.12
6-in. to 24-in. del'd New York	89.18
6-in. to 24-in., Birmingham	79.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	105.90
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

Percent Off List

1/2 in. & smaller x 6 in. & shorter	45
9/16 & 5/8 in. x 6 in. & shorter	46
3/4 in. & larger x 6 in. & shorter	43
All diam, longer than 6 in.	41
Lag, all diam over 6 in. long	44
Lag, all diam x 6 in. & shorter	46
Plow bolts	54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

1/2 in. and smaller	43
9/16 to 1 in. inclusive	42
1 1/4 to 1 1/2 in. inclusive	40
1 3/4 in. and larger	35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts

	USS	SAE
7/16 in. and smaller	46	
1/2 in. and smaller	44	
1/2 in. through 1 in.	44	
9/16 in. through 1 in.	43	
1 1/4 in. through 1 1/2 in.	41	42
1 3/4 in. and larger	35	

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate .65 and 10 In bulk .75
On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(1/2 in. and larger)

	Base per 100 lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$5.65
F.o.b. Lebanon, Pa.	5.80

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55

Cap and Set Screws

(In packages)

Percent Off List

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	53
3/4 to 1 in. x 6 in., SAE 1035, heat treated	44
Set screws, oval points	56
Milled studs	29
Flat head cap screws, listed sizes	16
Fillister head cap, listed sizes	37
Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.	

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF ₂ Content:	Base price per short ton
70% or more	\$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe. Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	\$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55
Prices quoted retroactive to Jan. 1, 1947.	

METAL POWDER

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28 1/2¢
Copper, electrolytic, 100 and 325 mesh	30 1/2¢ to 34 1/2¢
Copper, reduced, 150 and 200 mesh	30 1/2¢ to 32¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	10¢ to 17¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Domestic sponge iron, minus 48 mesh	10¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	.63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	44¢
Iron, electrolytic, annealed, minus 100 mesh, 99 + % Fe	39 1/2¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	.90¢ to \$1.75
Aluminum, 100, 200 mesh, carlots	.23¢ to 29¢
Antimony, 100 mesh	44¢
Cadmium, 100 mesh	\$2.00
Chromium, 100 mesh and finer	\$1.025
Lead, 100, 200 & 300 mesh 20 1/2¢	25 1/2¢
Manganese, minus 325 mesh and coarser	59¢
Nickel, 100 mesh	51 1/2¢
Silicon, 100 mesh	29¢
Solder powder, 100 mesh, 8 1/2¢ plus metal	
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb.	\$3.05
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	\$2.65
Under 100 lb	\$2.90

COKE

Furnace, beehive (f.o.b. oven) Net Ton	
Connellsville, Pa.	\$12.00 to \$13.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	\$18.60
Chicago, f.o.b.	17.50
New England, del'd	19.75
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, f.o.b.	17.75
Swedeland, Pa., f.o.b.	17.75
Buffalo, del'd	20.15
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erie, del'd	19.95
Cleveland, del'd	17.90
Cincinnati, del'd	18.59
St. Louis, del'd	18.03
Birmingham, del'd	15.76

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	Carloads, Per 1000
No. 1 Ohio	\$67.00
First quality, Pa., Md., Ky., Mo., Ohio	73.00
First quality, New Jersey	78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio	67.00
Sec. quality, New Jersey	70.00
No. 2 Ohio	59.00
Ground fire clay, net ton, bulk	10.50

Silica Brick

Pennsylvania and Birmingham	\$73.00
Chicago District and Alabama	82.00
Silica cement, net ton (Eastern)	12.50
East Chicago	13.50

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	\$64.00

Magnesite Brick

Standard, Balt. and Chester	\$86.00
Chemically bonded, Baltimore	75.00

Grain Magnesite

	std. 3/4-in. grains
Domestic, f.o.b. Balt. and Chester in bulk, fines removed	\$51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	27.00
in sacks with fines	31.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk, Midwest, add 10¢; Missouri Valley, add 20¢	\$11.05
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PRICES

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	\$4.47	\$5.73	\$5.82	\$4.78	\$5.68	\$4.82	\$4.55	\$4.83	\$5.53	\$8.34	\$8.44	\$9.88	\$9.95
New York	4.76	5.78 ¹	6.16	5.59	5.92	5.11	4.78	5.08	5.83	8.58	8.73	10.18	10.33
Boston	4.82	5.89 ¹²	6.22 ¹⁰	5.12	5.69	5.17	4.87	5.04	5.69	8.82	10.47	10.24	10.39
Baltimore	4.31		5.71	4.76		4.76	4.68	4.81	5.51				
Norfolk	4.80			5.20		5.05	5.05	5.10	5.90				
Chicago	4.25	5.10	5.65	4.35	5.45	4.60	4.40	4.40	5.10	8.05	8.15	9.30	9.40
Milwaukee	4.457	5.307 ¹	5.857	4.557	5.657 ⁵	4.808	4.607	4.608	5.307	8.407	8.507	9.657	9.757
Cleveland	4.25	4.95	5.78	4.52	5.00	4.60 ¹	4.65	4.40	5.10	8.33	8.43	9.30	9.49
Buffalo	4.25	5.10	6.05	5.25	5.70 ⁵	5.00	4.40 ¹	4.40 ¹	5.10	8.20	8.35	9.50	9.65
Detroit	4.35	5.20	6.02	4.72	5.63	4.88 ¹	4.77	4.50	5.22	8.50	8.60	9.73	9.78
Cincinnati	4.51	5.19	5.74	4.74	5.70	4.95	4.79	4.75	5.45				
St. Louis	4.58	5.43 ¹	5.87	4.68	5.82	4.88	4.73	4.73	5.47	8.57	8.67	9.82	9.92
Pittsburgh	4.25	5.10 ¹	5.65	4.35		4.60	4.40	4.40	5.10	8.20 ¹⁷	8.37 ¹⁷	9.50 ¹⁷	9.65 ¹⁷
St. Paul	4.63	5.48 ¹	5.88 ²	4.73 ⁷		4.937	4.787	4.787	5.91 ⁶				
Omaha	5.262		6.662	5.362		5.612	5.412	5.412	6.112				
Indianapolis	4.553	5.324	5.874	4.653	5.753	4.903	4.703	4.703	5.403				
Birmingham	4.45 ¹¹		5.65	4.45 ¹¹		4.65 ¹¹	4.40 ¹¹	4.40 ¹¹	6.04				
Memphis	4.82 ¹¹	5.87 ¹	6.37	5.02 ¹¹		5.17 ¹¹	4.97 ¹¹	4.97 ¹¹	5.87				
New Orleans	*4.99 ¹¹	6.28 ¹		5.19 ¹¹		5.34 ¹¹	*5.04 ¹¹	*5.14 ¹¹	6.28 ⁶				
Houston	5.30		6.60	5.25		5.35	5.15	5.30	6.80	9.40 ¹⁷	9.20 ¹⁷	10.35 ¹⁷	10.45 ¹⁷
Los Angeles	5.75	7.35 ¹	7.40	6.05	8.70 ⁵	5.55	5.35	5.50	7.35 ¹⁴	9.55 ¹⁵	9.35 ¹⁵	10.95 ¹⁵	11.05 ¹⁵
San Francisco	5.40 ⁸	6.85	6.85	5.75 ⁸		5.50	5.20	5.05	7.50 ¹⁰	9.55 ¹⁵	9.35 ¹⁵	10.95 ¹⁵	11.05 ¹⁵
Seattle	5.45 ⁴	7.25 ²	6.85	5.60 ⁴		5.60 ⁴	5.25 ⁴	5.45 ⁴	7.45 ¹⁴		8.55 ¹⁶		11.15 ¹⁶
Portland	5.30 ⁴	7.10 ²	6.70	5.60 ⁴		5.45 ⁴	5.25 ⁴	5.55 ⁴	7.45 ¹⁴				
Salt Lake City	6.40		7.85	6.70		6.20	6.35	6.55	7.55				

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb;

strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 450 to 1499 lb; (10) 500 to 999 lb;

(11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) 1000 to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

‡ Add 40¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT* PRICES

DELIVERED PRICES† (BASE GRADES)

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	40.00	40.50	41.00	41.50		Boston	Everett	\$0.50 Arb.		45.50	46.00		
Birmingham	38.88	36.38				Boston	Steelton	5.78	45.78				51.78
Buffalo	40.00	39.38				Brooklyn	Bethlehem	3.60	43.60	44.10	44.60	45.10	
Chicago	41.50*	40.00*	40.50			Cincinnati	Birmingham	5.85	44.73	42.23			
Cleveland	38.50	39.00	39.50	40.00		Jersey City	Bethlehem	2.21	42.21	42.71	43.21	43.71	
Duluth	39.00	39.50	39.50	40.00		Los Angeles	Provo	7.13	46.13	46.63			
Erie	39.75*	40.25*	40.75*			Mansfield	Cleveland-Toledo	2.56	41.06	41.56	42.06	42.56	
Everett	38.50	39.00	39.50	40.00		Philadelphia	Bethlehem	2.00	42.00	42.50	43.00	43.50	
Granite City	39.50	40.00	40.50			Philadelphia	Swedeland	1.21	46.21	46.71	47.21	47.71	
Neville Island	39.00	39.50	39.50	40.00		Philadelphia	Steelton	2.59	42.59				48.59
Provo	39.00	39.50	39.50			San Francisco	Provo	7.13	46.13	46.63			
Sharpville	39.00	39.50	39.50	40.00		Seattle	Provo	7.13	46.13	46.63			
Steelton	40.00					St. Louis	Granite City	0.75 Arb.	40.25	40.75	41.25		
Struthers, Ohio	39.50				46.00								
Swedeland	45.00	45.50	46.00	46.50									
Toledo	38.50	39.00	39.50	40.00									
Troy, N. Y.					46.00								
Youngstown	39.00	39.50	39.50	40.00									

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight. Chicago malleable pig iron quoted in error on Comparison of Price page last week at \$1.00 below the market.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.10 pct. and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00

pct. \$2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—\$47.50; f.o.b. Buffalo—\$50.75. Add \$1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct

Mn over 1.00 pct. Add \$1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are \$1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus \$55.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, \$62.46. High phosphorus charcoal pig iron is not being produced.

FERROALLOY PRICES

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.
 Carload lots (bulk)\$145
 Less ton lots (packed) 189.00
 Delivered Pittsburgh 151.00
 \$1.80 for each 1% above 82% Mn; penalty, \$1.80 for each 1% below 78%.
 Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.
 Eastern Central Western
 Carload, bulk ... 8.70 8.95 9.50
 Ton lots 10.30 10.90 12.80
 Less ton lots ... 11.20 11.80 13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.
 16-19% Mn 19-21% Mn
 3% max. Si 3% max. Si
 Carloads \$46.00 \$47.00
 F.o.b. Pittsburgh 50.00 51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.
 96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.
 Carload, bulk 32
 L.c.l. lots 34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.
 Carloads 32
 Ton lots 34
 Less ton lots 36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.
 Carloads Ton Less
 0.07% max. C. 0.06% 23.00 24.85 26.05
 P, 90% Mn. 22.50 24.35 25.55
 0.10% max. C. 22.00 23.85 25.05
 0.15% max. C. 21.50 23.35 24.55
 0.30% max. C. 21.00 22.85 24.05
 0.50% max. C. 18.00 19.85 21.05
 0.75% max. C. 18.00 19.85 21.05
 7.00% max. Si. 18.00 19.85 21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.
 Carload bulk 7.80
 Ton lots 9.45
 Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet 8.75
 Ton lots 10.35
 Less ton lots 11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth \$78.00, foundry, \$79.00; \$78.75 f.o.b. Niagara Falls; \$77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.
 Eastern Central Western
 96% Si, 2% Fe. 16.90 17.50 18.10
 97% Si, 1% Fe. 17.30 17.90 18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.
 Eastern Central Western
 Carload, bulk ... 5.25 5.50 5.70
 Ton lots 6.85 7.45 7.75
 Less ton lots ... 7.75 8.35 8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.
 Eastern Central Western
 25% Si 15.50 10.00
 50% Si 9.30 9.80
 75% Si 11.80 12.10 12.85
 85% Si 13.30 13.60 14.35
 90% Si 15.00 15.30 16.00

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.
 Eastern Central Western
 0.06% C 26.50 26.90 27.00
 0.10% C 26.00 26.40 26.50
 0.15% C 25.50 25.90 26.00
 0.20% C 25.25 25.65 25.75
 0.50% C 25.00 25.40 25.50
 1.00% C 24.50 24.90 24.75
 2.00% C 24.25 24.65 24.75
 65-69% Cr.
 4.9% C 18.60 19.00 19.15
 62-66% Cr. 4-6% C.
 6-9% Si 18.60 19.00 19.15
 Briquets—Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.
 Eastern Central Western
 Carload, bulk ... 12.50 12.75 12.85
 Ton lots 14.00 14.90 15.50
 Less ton lots ... 14.90 15.80 16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.
 High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.
 Eastern Central Western
 Carload 19.70 20.10 20.25
 Ton lots 21.85 23.15 23.95
 Less ton lots ... 23.35 24.65 25.45
 Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.
 Eastern Central Western
 Carload 25.00 25.40 25.50
 Ton lots 27.30 27.95 29.15
 Less ton lots ... 29.10 29.75 30.95

Chromium Metal

Contract prices, cents per lb. chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.
 Eastern Central Western
 0.20% max. C. ... 97.00 98.50 99.75
 0.50% max. C. ... 93.00 94.50 95.75
 9.00% min. C. ... 91.50 93.00 94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.
 30-35% Ca, 60-65% Si, 3.00% max. Fe
 r 28-32% Ca, 60-65% Si, 6.00% max. Fe.
 Eastern Central Western
 Carloads 16.25 16.75 18.80
 Ton lots 19.35 20.10 22.25
 Less ton lots ... 20.85 21.60 23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.
 16-20% Ca, 14-18% Mn, 53-59% Si.
 Eastern Central Western
 Carloads 17.50 18.00 20.05
 Ton lots 19.80 20.65 22.40
 Less ton lots ... 20.80 21.65 23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.
 Cast Turnings Distilled
 Ton lots \$1.85 \$2.70 \$3.40
 Less ton lots ... 2.20 3.05 4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.
 Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.
 Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.
 Eastern Central Western
 Ton lots 18.00 19.10 21.05
 Less ton lots ... 19.25 20.35 22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.
 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.
 Eastern Central Western
 Ton lots 15.75 16.85 18.80
 Less ton lots ... 17.00 18.10 20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed... \$2.25
 Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.
 Openhearth \$2.90
 Crucible 3.00
 High speed steel (Primos) ... 3.10
 Vanadium pentoxide, 88-92% V₂O₅ contract basis, per pound contained V₂ \$1.20
 Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb
 Ton lots \$2.50
 Less ton lots \$2.55
 Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. 95¢
 Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. 80¢
 Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo. 80¢
 Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo. 80¢
 Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti \$1.23
 Less ton lots \$1.25
 Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti \$1.35
 Less ton lots \$1.40
 High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton ... \$142.50
 Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., \$3 unitage per gross ton \$65.00
 Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
 Carload lots 18.40¢
 Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy
 Carload, bulk 6.00¢
 Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.
 Carload 6.90¢
 Ton lots 7.40¢
 Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound Car lots 9.50¢
 Ton lots 10.25¢
Boron Agents
 Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.
 Ferroboreon, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.
 Eastern Central Western
 \$1.20 \$1.23 \$1.21
 Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.
 Ton lots ... \$1.89 \$1.903 \$1.935
 Less ton lots 2.01 2.023 2.044
 Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.
 Less ton lots...\$1.80 \$1.8125 \$1.8445
 Silcaz, contract basis, f.o.b. plant freight allowed, per pound.
 Carload lots 39.00¢
 Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.
 No. 1 93¢
 No. 6 63¢
 No. 79 45¢
 Bortram, f.o.b. Niagara Falls
 Ton lots, per pound 45¢
 Less ton lots, per pound 50¢
 Carbortram, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.
 Ton lots, per pound 8.0¢
 Borosil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B \$6.25.